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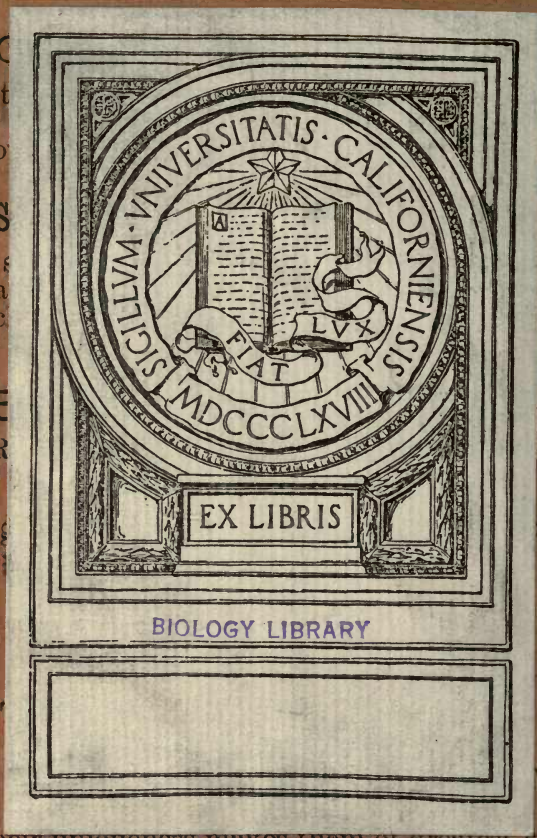

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ROMEYN B. HOUGH,

LOWVILLE, N. Y.

HOUGH'S AMERICAN WOODS.

PART VI.

THE

AMERICAN WOODS,

EXHIBITED BY ACTUAL SPECIMENS

AND WITH COPIOUS EXPLANATORY TEXT,

BY

ROMEYN B. HOUGH, B. A.

PART VI.

REPRESENTING TWENTY-FIVE SPECIES

BY

TWENTY-FIVE SETS OF SECTIONS.

LOWVILLE, N. Y., U. S. A.
PUBLISHED AND SECTIONS PREPARED BY THE AUTHOR.
1895.

WEED-PARSONS PRINTING CO.,
ELECTROTYPERS AND PRINTERS,
ALBANY, N. Y.

TO MY FRIEND AND CLASS-MATE

Prof. William Trelease,

DIRECTOR

MISSOURI BOTANICAL GARDENS,

AND AN IMPORTANT CONTRIBUTOR TO THE SCIENCE OF BOTANY,

THIS SIXTH VOLUME OF

AMERICAN WOODS

IS

AFFECTIONATELY DEDICATED.

PREFACE TO THE SERIES.

The necessity of more generally diffused information concerning the variety and importance of our forest trees is justification enough for the appearance of this work, especially at this day, when the demands of Forestry in this country are constantly more and more keenly felt. The work was undertaken at the suggestion of my father, whose intense interest in Forestry, and a kindred taste, at once gave me inspiration to the work. It was entered upon with the expectation of his valuable companionship and counsel during its progress, but, alas ! that I was destined to have only at the outset, and, while I was then left ever to mourn the loss of a kind father, companion and teacher, the reader must fail to find in these pages that value and finish which his mind would have given them.

Among the happiest pictures of my memory are those in which I see my father's delight, as I would show to him, from time to time, my successful progress in devising a way of making the sections for this work, and if only for the happiness which its appearance would have caused him, could he have lived until this day, I have felt duty-bound to go on with it, even though left to do it alone.

The work is the outgrowth of one, of somewhat similar plan, proposed by my father some years since, but which he did not carry into effect. Its design is primarily and principally to show, in as compact and perfect a manner as possible, authentic specimens of our American woods, both native and introduced. For that end three sections, respectively transverse, radial and tangential to the grain (see Glossary), are made of each timber, sufficiently thin to allow in a measure the transmission of light, and securely mounted in well made frames.

The three planes above mentioned show the grain from all sides, so to speak, no plane being possible but that would be either one of them or a combination of them. The difficulty, however, of cutting a great number of sections exactly on those planes is obvious, so let it be understood that the terms, "transverse," "radial" and "tangential," are, in many cases, only approximately exact in their application.

My endeavor is to show, either in a part or all of the sections standing to represent a species, both the heart and sap-wood, but with some woods

as the Sumach, for instance, where usually only the outermost ring, or a part of it, could be said to represent the sap-wood, the display of that is quite impossible. In certain other woods, as the Spruce, etc., the transition from sap to heart-wood is almost indistinguishable by any difference in color, and, although both may be shown in the sections, one can scarcely distinguish between them.

The sequence of the numbers given to the various species is of importance only to show the botanical arrangement within a given Part, each Part being independent of the others.

The text of this work has been added rather as a secondary matter, to supply to those not having it in other form, such information as is of importance, in connection with the wood specimens, to give a fairly good acquaintance with the trees represented. It contains little, if any thing, new to the botanist, but to others it is hoped it may be of some value.

In its preparation some use has been made of my father's Elements of Forestry, and thanks are due the publishers of that work — Messrs. Robert Clarke & Co. of Cincinnati, Ohio — for the use of cuts in reproducing a number of its illustrations. Other valuable books of reference have been the works of Drs. Gray, Wood and Bessey, LeMaout and Decaisne's Descriptive and Analytical Botany, Prof. C. S. Sargent's Report on the Forest Trees of North America (constituting Vol. IX, Ninth Census of the United States, 1880), Micheaux and Nuttall's North American Sylva, George B. Emerson's Trees and Shrubs of Massachusetts, D. J. Browne's Trees of America, etc.

The authenticity of the timbers represented in this work has been a subject of personal attention and special care on the part of the author. The trees selected for specimens have been identified in the field, before felling, while the leaves, flowers or fruit (one or more) have been obtainable, and he can, hence, vouch for the authenticity of every specimen represented.

Succeeding parts, uniform in style with Part I, and representing in each case twenty-five additional species, are planned to appear later, with the ultimate end in view, of representing, as nearly as possible, all of the American woods, or at least the most important, in such a series of volumes as this one.

Upon the reception which this meets in public favor, and upon the co-operation of those interested in the cause, must naturally depend the carrying out of that plan. It is hoped that greater experience and skill will enable us to obviate in future parts the faults which occur, from lack of those qualities, in this.

Notice of errors in this work will be thankfully received in hopes of profiting therefrom in the future.

LOWVILLE, N. Y., *March* 30, 1888.

PREFACE TO PART VI.

The wide-spread interest in the woods of the Pacific Slope has prompted me to visit the marvelous forests of that region, that I may represent their varied wealth of species next in AMERICAN WOODS. It is a region of unparalleled interest to the lover of trees, as he notes the scores of kinds which he finds there and nowhere else, while the size and density of growth of some of them, under the benign influence of the Pacific, can not fail to arouse in him feelings of admiration and awe. Indeed, I found myself loath to turn away from the contemplation of tree-growth there so grandly displayed, and not even the pouring of the winter rains in the valleys or the depth of snow upon the mountains deterred me from my purpose.

Once night overtook us unexpectedly far above the snow line (in winter) without even coats and vests on, so laborious had it been to make our way through the deep snow up to the home of the Big Trees, and so hotly does the sun even in winter sometimes beat down upon the Sierra Nevadas. The nights on the other hand are very cold, and luckily on that occasion we were able to seek shelter for the night at the home of a hermit, which had been deserted on the approach of winter for a more congenial clime down the mountain. Fortunate we thought we were, as the thick ice which formed that night, even within our cabin, convinced us. The next day our laborious journey was rewarded by a visit with the Sequoias, an experience which very few attempt in winter, and by night-fall we had succeeded in getting out and dragging down to the place where we had left our team a fine block of the wood, specimens from which the reader now has before him.

Contrast this with a long tramp over the burning sands of the Colorado Desert, in quest of the Palo Verde and other trees of that region, with a bare-headed, long-haired Indian as assistant, whose powers of endurance against thirst and the intense heat are only equaled by those who, like him, are inured to it, and one has an idea of what collecting the woods in California means. Still, all of this has its fascination, notwithstanding the rough places.

Among the pleasant experiences must be mentioned the occasional contact with those of kindred spirit, who are engaged in the study of

the Botany of California, and their willingness to render assistance, by giving directions to important localities, etc. I wish particularly to mention in that connection assistance rendered by Mr. and Mrs. Brandegee and Miss Alice Eastwood, of the California Academy of Sciences, and Prof. and Mrs. J. G. Lemmon, Botanists, of Oakland, Cal. At San Bernardino it was my delight and good fortune to meet Mr. S. B. Parish, Author of Trees of Southern California, etc., who rendered me very valuable assistance, and who, with Mrs. Parish, made my stay in their locality among the pleasantest experiences of my California trip.

Last, but by no means least, I wish to gratefully acknowledge the courtesies extended by Mr. C. P. Huntington, President of the Southern Pacific Railroad Company, whose liberality in aiding the diffusion of knowledge of our trees is already attested by his contributions to the Jesup collection of Woods in the American Museum of Natural History in New York.

Part VI, AMERICAN WOODS, comprises the first installment of the woods of the Pacific Slope. Our present purpose is to continue the woods of that region in the parts of the series immediately following, Part VII being already well advanced.

LOWVILLE, N. Y., *March* 5, 1895.

A KEY, BASED MAINLY UPON THE FLOWERS,

Designed as an Aid in the identification of the Species represented in Parts I to VI inclusive.

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a. **Angiospermæ** — seeds in a closed ovary.
b. *Polypetalous* — petals present and distinct.
c. Stamens numerous, more than 10, and
d. Calyx inferior — wholly free from the pistil or pistils.
e. Pistils numerous and cohering in a cone-like mass. (*Magnoliaciæ*).
f. Anthers opening inward; leaves folded lengthwise in the bud (*Magnolia*), pointed at both ends and
g. Thick
Glaucous beneath .. .. 51. M. GLAUCA.
Rusty tomentose beneath .....101. M. GRANDIFLORA.
*g*². Thin, green beneath. .....1. M. ACUMINATA.
*f*². Anthers opening outward and leaves folded crosswise in the bud.
2. LIRIODENDRON TULIPIFERA.
*e*². Pistils more than one, separate (or nearly so) stamens inserted on receptacle and filaments shorter than anthers (*Anonaceæ*).
76. ASIMINA TRILOBA.
*e*³. Pistil solitary and
f. One celled, style single, flowers perfect; fruit
g. A drupe with stone bony (*Prunus*) and
h. Compressed, with ridged margin; calyx-lobes glandular-serrate.
81. P. NIGRA.
*h*². Marginless; flowers in
i. Racemes terminal .....29. P. SEROTINA.
*i*². Corembose umbels .....55. P. PENNSYLVANICUM.
*i*³. Umbels; leaves
Acuminate, hairy beneath .....56. P. AVIUM.
Acute, nearly smooth beneath . ...82. P. CERASUS.
*g*². An achenium tipped with elongated style
130. CERCOCARPUS PARVIFOLIUS.
*f*². Compound as shown by the styles and cells of ovary; leaves
g. Punctate with pelucid dots (*Aurantiaceæ*); stamens about
20; fruit globose, flattened at ends. ..103. CITRUS AURANTIUM.
35; fruit globose-oblong, pointed .....104. CITRUS LIMONUM.
*g*². Not punctate.
h. Simple and calyx
Valvate in the bud, deciduous (*Tiliaceæ*) stamens polydelphous (*Tilia*) and with 5 petal-like scales opposite the petals.
3. TILIA AMERICANA.

c. Imbricated in the bud, persistent; stamens at the base of petals (*Temstrœmiaceæ*); calyx simple; stamens 5-adelphous (*Gordonia*); leaves coriaceous, evergreen....102. G. LASIANTHUS.

*h*². Compound (*Meliaceæ*).....105. MELIA AZEDARACH.

*d*². Calyx superior — adnate — to the ovary or at least its lower half; ovules

e. More than one in each cell; ovary

f. 1-celled, 2-ovuled; flowers dicœcious.....131. GARRYA ELLIPTICA.

*f*². 2-5-celled; fruit a

g. Pome with 2-5 papery carpels (*Pyrus*); leaves

h. Simple and styles

i. United below; leaves

Serrate (not lobed), downy.....30. P. MALUS.

Incisely serrate and sublobate, smooth.....83. P. CORONARIA.

*i*². Distinct.....57. P. COMMUNIS.

*h*². Pinnately compound.....84. P. SAMBUCIFOLIA.

*g*². Pome drupe-like with 1-5 bony seeds (*Cratægus*); leaves

h. Villous, cuniform, obovate.....58. C. PUNCTATA.

*h*². Glabrous, abrupt at base.....86. C. COCCINEA.

attenuate at base.....85. C. CRUS-GALLI.

*f*². Ovary 10-celled.....59. AMELANCHIER CANADENSIS.

*e*². Only one in each cell; stamens 4; styles and stigmas 1 (*Cornaceæ*); cymes

Subtended by a 4-leaved involucre.....88. CORNUS FLORIDA.

Naked, leaves alternate.....87. CORNUS ALTERNIFOLIA.

*c*². Stamens few, opposite the petals and of the same number; pistil one, with 2-4-celled ovary; sepals

Obsolete; petals valvate (*Vitaceæ*).....78. VITIS ÆSTIVALIS.

Present and valvate (*Rhamnaceæ*); fruit drupe-like berry with 2-5 nutlets (*Rhamnus*) convex on back; leaves deciduous.....126. R. PURSHIANA.

*c*³. Stamens few, not more than 10, alternate with the petals when of the same number.

d. Calyx inferior — free from the ovary.

e. Ovaries 2–5, separate; styles

Terminal and conniving.....106. XANTHOXYLUM CLAVA-HERCULIS.

Lateral and distinct.....4. AILANTHUS GLANDULOSUS.

*e*². Ovary single, but compound as shown by the cells, styles or stigmas.

f. One-celled and one-seeded; styles or stigmas three; shrubs or trees with regular flowers (*Anacardiaceæ*); leaves compound with 11–31 oblong-lanceolate acuminate leaflets; common petiole densely villous and not winged; flowers in terminal thyrses.....5 RHUS TYPHINA.

*f*². Two to several-celled and flowers

g. Irregular (*Aesculus*); fruit

Prickly.....6. AE. HIPPOCASTANUM.

Smooth.....127. AE. CALIFORNICA.

*g*². Regular, stamens as many as the petals; trees with leaves

h. 3-foliate.....77. PTELEA TRIFOLIATA.

*h*². Simple, persistent or subpersistent.

Stamens 5.....107. CYRILLA RACEMIFLORA.

Stamens 4; fruit berry-like.....52. ILEX OPACA.

Stamens 10; leaves simple, evergreen.

108. CLIFTONIA LIGUSTRINA.

*e*³. Ovary single and simple, with one parital placenta (*Leguminosæ*); corolla
f. Papilionaceous; stamens distinct.....80. ROBINIA PSEUDACACIA.
*f*². Subregular and imbricated in aestivation; flowers
g. Perfect (*Circidium*).....128. C. TORREYANUM.
*g*². Dicœcious; stamens 10; tree unarmed.
27. GYMNOCLADUS CANADENSIS.
*g*³. Polygamous; stamens 5; tree armed with thorns usually triple (*Gleditschia*) pods
Linear, many-seeded. .....28. GLEDITSCHIA TRIACANTHOS.
Obliquely ovate, 1-seeded.....109. GLEDITSCHIA MONOSPERMA.
*f*³. Regular (*Prosopis*).....129. P. JULIFLORA.
*d*². Calyx superior — adnate to the ovary; flowers in umbels; stamens 5; styles 5; fruit drupe-like with 5 cells each with a single ovule (*Aralia*); arborescent and armed with prickles.....8. ARALIA SPINOSA.
*b*². *Gamopetalous* — petals present and united; stamens
c. As many as the lobes of the corolla which is
d. Irregular; ovary 2-celled (*Bignoniaceæ*); leaves simple and
Broadly-ovate (*Catalpa*).....89. C. BIGNONIOIDES.
Linear (*Chlopsis*).....134. C. SALIGNA.
*d*². Regular; stamens 2..... 112. OSMANTHUS AMERICANUS.
*c*². Fewer than the lobes of the corolla; inserted
d. On its base and filaments distinct.....61. DIOSPYROS VIRGINIANA.
*d*². On an hypogynous disk; ovary
5-celled, several ovules in each cell.....132. ARBUTUS MENZIESII.
5-10-celled, single ovule in each cell...133. ARCTOSLAPHYLOS PUNGENS.
*b*³. *Apetalous* — without petals.
c. Flowers not in catkins; pistil one, simple or compound, and the cells of the ovary containing 1–2 seeds each.
d. Ovary inferior — adnate its whole length to the calyx-tube — 1-celled and 1-seeded; style 1, stigmatic down the side (*Nyssa*); fertile peduncles
2–5-flowered.....9. NYSSA MULTIFLORA.
Single flowered and peduncle short and downy .110. NYSSA OGECHE.
Two or more flowers.....9. N. MULTIFLORA.
*d*². Ovary superior — free from the calyx.
e. Stipules sheathing the stem; trees with naked monœcious flowers arranged in heads, which are
Solitary.....13. PLATANUS OCCIDENTALIS.
2-7 together in a moniliform spike .....135. PLATANUS RACEMOSA.
*e*². Stipules not sheathing the stem or none.
f. Ovules a pair in each cell of the ovary, which becomes in
g. Fruit a double samara (*Acer*).
h. Leaves simple and palmately veined; flowers appearing
i. With the leaves in pendulous corymbs.....7. A. SACCHARINUM.
*i*². Before the leaves in short umbels, and
Apetalous; young fruit woolly.....26. A. DASYCARPUM.
Petals present, linear-oblong; fruit smooth..53. A. RUBRUM.
*i*³. After the leaves, in drooping racemes
79. A. PENNSYLVANICUM.
*h*². Leaves compound.....54. A. NEGUNDO.
*g*². Fruit a 1-celled and 1-seeded samara (*Fraxinus*).

h. Samara terete at base; leaflets petiolulate
New growth smooth.....10. F. AMERICANA.
New growth pubsecent.....31. F. PUBESCENS.
*h*². Samara broad at base.....62. F. SAMBUCIFOLIA.
*f*². Ovules single in each of the 1 or 2 cells of the ovary.
g. Anthers opening by uplifted valves; stigma single and entire (*Lauraceæ*) flowers
Perfect; calyx persistent; leaves evergreen (*Persea*).
113. P. CAROLINENSIS.
Dicœcious, calyx deciduous, leaves deciduous; involucre none (*Sassafras*).. .....32. S. OFFICINALE.
*g*². Anthers extrorse; stigma 2-cleft; fruit a
h. Samara, 1-celled and winged all round (*Ulmus*).
i. Flowers nearly sessile; samara not ciliate-fringed; leaves very rough above.....11. U. FULVA.
*i*². Flowers on drooping pedicels; samara ciliate-fringed; leaves smooth.
Bud-scales glabrous; flowers fascicled; branches not corky-winged.....33. U. AMERICANA.
Bud-scales downy-ciliate; flowers racemed; branches corky-winged..... .... 34. U. RACEMOSA.
*h*². Capsule, dry, nut-like, not winged (*Planera*).
114. P. AQUATICA.
*g*³. Anthers introrse; fruit a dark-purple drupe; leaves long-taper-pointed..... .....12. CELTIS OCCIDENTALIS.
*g*⁴. Anthers laterally dehiscent; fruit a drupe.
111. FORESTIERA ACUMINATA.
*c*². Flowers diclinous and one or both sorts in catkins.
d. Only one sort (the staminate flowers) in catkins.
e. Fertile flowers single or clustered; fruit naked; leaves pinnately compound (*Juglandaceæ*).
f. Corolla present in the fertile flowers; fruit with valveless epicarp (*Juglans*).
g. Fruit ovate, oblong and viscid-hairy.....14. J. CINEREA.
*g*². Fruit globose, roughly dotted (not viscid-hairy).....35. J. NIGRA.
*f*². Corolla not present in the fertile flower; fruit with usually 4-valved epicarp (*Carya*) which is
g. Thick; valves separating to base; bark
h. In loose plates, leaflets
5, smoothish; nut small ....36. C. ALBA.
7–9; nut large..... .. ..64. C. SULCATA.
*h*². Close, leaflets 7–9, tomentose.....90. C. TOMENTOSA.
*g*². Thin; bark close; nut
h. Quite smooth, small, thin-shelled, leaflets
5–7; kernel edible .... 91. C. MICROCARPA.
7–9; kernel very bitter.....37. C. AMARA.
*h*². More ridged, larger, thicker-shelled; leaflets 5–9.
65. C. PORCINA.
*h*³. Rugose, angular; leaflets 11–13.....115. C. AQUATICA.
*e*². Fertile flowers 1–3 together, invested wholly or partly with an involucral covering; leaves simple (*Cupuliferæ*).

f. Involucre valveless, cup-like, composed of many scales and only partly inclosing the one nut, *i. e.*, acorn (*Quercus*).

g. Leaves with teeth and lobes obtuse or rounded (not bristle pointed); acorns maturing first year (and hence on new wood) and leaves

h. Oblong, sinuate-pinnatifid, nut ⅓ immersed in the tubercled cup. 38. Q. ALBA.

*h*². Lyrate-pinnatifid, nut ½ or more immersed.

Peduncles shorter than petioles... .....39. Q. MACROCARPA.

Peduncles longer than petioles.....66. Q. BICOLOR.

*h*³. Obovate and deeply sinuate-lobed, the two lobes near the summit much the largest.....93. Q. OBTUSILOBA.

*h*⁴. Oblong, undulately crenate-toothed, peduncles shorter than petioles; acorn

Less than 1 in. in length..... 67. Q. PRINUS.

More than 1 in. in length .....116. Q. MICHEAUXII.

*h*⁵. Lanceolate-oblong; sharply undulate-toothed; acorn small. 68. Q. MUHLENBERGII.

*h*⁶. Elliptical or oblong, evergreen.....117. Q. VIRENS.

*h*⁷. Obovate-spatulate, partly deciduous.....118. Q. AQUATICA.

*h*⁸. Oval-obovate, sinuses narrow and lobes broad. 136. Q. GARRYANA.

*h*⁹. Orbicular-oblong, sinuately-spinous-toothed, subpersistent. 138. Q. AGRIFOLIA.

*g*². Leaves with teeth and lobes acute and bristle-pointed; acorns maturing the second year (and hence on old wood); leaves

h. Moderately pinnatifid; cup very shallow and saucer-shaped; scales fine ....15. Q. RUBRA.

*h*². Deeply pinnatifid; lobes

i. Rather broad; inner bark yellowish .....93. Q. TINCTORIA.

*i*². Narrow; sinuses broad and rounded; acorn

Ovoid-oblong, ½ invested in a coarse-scaled cup. 69. Q. COCCINEA.

Flattened-globular, ¼ invested in fine-scaled cup. 94. Q. PALUSTRIS.

*h*³. Serrate-dentate, persisistent.....138. Q. AGRIFOLIA.

*f*². Involucre 2-4-valved, becoming hard and prickly and inclosing 1-3 sweet, edible, flattened, subglobose nuts; sterile flowers in catkins leaves

Deciduous.....40. CASTANEA VESCA.

Evergreen .....139. CASTANOPSIS CHRYSOPHYLLA.

*f*³. Involucre 4-valved and inclosing two, 3 cornered, edible nuts. 16. FAGUS FERRUGINEA.

*e*³. Fertile flowers in short catkins; nuts small and achenium-like; sterile flowers destitute of calyx; leaves simple.

f. Nutlet inclosed in a bladder-like bag.....41. OSTYRA VIRGINICA.

*f*². Nutlet not inclosed but subtended by an enlarged leafy bract. 42. CARPINUS CAROLINIANA.

*d*². Both staminate and pistillate flowers in catkins.

e. Ovary and pod 2-celled, many-seeded. 60. LIQUIDAMBAR STYRACIFLUA.

*e*². Ovary 1-2-celled with a single ovule in each cell;
f. Calyx scale-like or none; stigmas 2, filamentous; fertile flowers arranged 2 or 3 together under each scale of the cone-like catkin (*Betula*); bark
g. Brown and close, catkins erect.....44. B. LENTA.
*g*². Yellowish-gray and ragged, catkins sub-erect.....17. B. LUTEA.
*g*³. White, and leaves.
Deltoid, smooth both sides.....70. B. POPULIFOLIA.
Ovate, hairy on veins beneath.....43. B. PAPYRACEA.
*g*⁴. Reddish-brown, shaggy.....95. B. NIGRA.
*f*². Calyx regular and succulent in fruit.....63. MORUS RUBRA.
*e*³. Ovary 1-celled and many-seeded, the seeds at maturity furnished with a hairy tuft (*Salicaceæ*).
f. Bracts of the catkins entire; calyx wanting; stamens 2-7 (*Salix*); catkins on leafy branchlets with
g. Pallid villous dentate scales.....140. S. LAEVIGATA.
g.² Yellowish deciduous scales; capsules glabrous; stamens; 3–5 petioles.
h. Glandular; scales of catkin entire; leaves
Narrow-lanceolate; fruiting catkins rather dense..45. S. NIGRA.
Lanceolate or ovate-lanceolate, glaucous beneath, fruiting catkins very loose.....71. S. AMYGDALOIDES
*h*². Not glandular; scales dentate.....46. S. ALBA.
*f*². Bracts of the catkins lacerately fringed; calyx a disk-like cup; stamens 8-30, leaves broad (*Populus*); styles with
g. Narrow lobes; capsule small; seeds minute, petioles laterally compressed; leaves
h. Cordate-orbicular, finely serrate.....72. P. TREMULOIDES.
*h*². Ovate-orbicular, coarsely dentate, beneath
Glabrous at maturity.....18 POPULUS GRANDIDENTATA.
Densely tomentose at maturity.....96. POPULUS ALBA.
*h*³. Deltoid; branchlets terete.....73. P. DILATATA.
*g*². Broad lobes; capsules large; seeds 1 line or more in length and leaves
Acuminate, smooth, strongly reticulated and whitish beneath. 47. P. BALSAMIFERA.
Obtuse or rounded at apex, tomentose at least along the veins beneath.....97. P. HETEROPHYLLA.
Broadly deltoid; branchlets angled.....48. P. MONILIFERA.
*a*². **Gymnospermæ** — seeds naked, borne superficially on carpellary scales. Cone-bearing (*Coniferæ*); scales
b. Many, imbricated, each in the axil of a bract and bearing 2 inverted ovules; seeds winged.
c. Leaves evergreen, fascicled; cones maturing the second year (*Pinus*).
d. Leaves in 2s; cones with scales
e. Smooth (awnless); leaves
5–6 in. long, with long sheaths.....19. P. RESINOSA.
1 in. or thereabouts in length, sheaths short.....99. P. BANKSIANA.
*e*². Armed with a prickle; leaves
f. 1½–2½ in. long; cones 1–3 in. cylindrical-ovoid when closed, oblique. 148. P. CONTORTA.
*f*². 2–3 in. long; cone 2–2½ in. long.....122. P. CLAUSA.

*f*³. 3–5 in. long ; sheaths elongated ; branchlets
Rough ; prickle inclined nearly at right angle to the axis of cone when closed .....75. P. MITIS.
Smooth ; prickle inclined more towards the apex of the cone. 123. P. GLABRA.
*f*³. 1½–2½ in. long ; sheaths short.....98. P. INOPS.
*d*². Leaves in 3s and scales of cone thickened at apex and armed with a prickle ; leaves
3–6 in. long, cone about 2 in. long ; prickles strong .....50. P. RIGIDA.
5–8 in. long ; cone 2–3 in ; prickles weak .....121. P. SEROTINA.
7–10 in. long, stout; cone 3–5 in. long, sessile.. ...147. P. PONDEROSA.
8–15 in. long ; cone 6–10 in. long..... .....124. P. PALUSTRIS.
*d*³. Leaves in 5s with very short sheaths ; cones longer than the leaves and with scales not thickened at the ends, unarmed; cones
4–6 in. long ....49. P. STROBUS.
12–18 in. long..... .....146. P. LAMBERTIANA.
*d*⁴. Leaves in both 2s and 3s, 7–12 in. long; cone 3–6 in. long, glossy, brown. 125. P. CUBENSIS.
*c*². Leaves evergreen, scattered (not fascicled) ; cones with thin scales, maturing the first year.
d. Cones erect, cylindrical, large (3–4 in.); leaves flat, linear (*Abies*) 22. A. BALSAMEA.
*d*². Cones pendent and
e. Bracts inconspicuous; cones
f. Small, 8 lines or less, scales entire at tip; leaves linear. 21. TSUGA CANADENSIS.
*f*². Larger, leaves 4-angled (*Picea*)
1–1½ in. long, ovate, scales eroded at tip; branchlets pubescent. 20. PICEA NIGRA.
2 in. long, cylindrical-ovoid, entire at tip, branchlets smooth. 100. PICEA ALBA.
1½–3 in. long, cylindrical, scales elongated and incisely denticulate at tip.....149. PICEA SITCHENSIS.
*e*². Bracts conspicuously exserted, cone
2–3 in. long..... .....150. PSEUDOTSUGA TAXIFOLIA.
*c*³. Leaves deciduous, soft, needle-shaped and in fascicles of many each ; cones about 8 lines in length, scales thin (*Larix*) and with inflected margins. 23. L. AMERICANA.
*b*². Few.
c. Imbricated, without bracts and each bearing two erect ovules; flowers
Monœcious, scales thinnish and 8–12 (*Thuya*).....24. T. OCCIDENTALIS.
Dioecious, scales fleshy and consolidated, making a dark blue berry-like fruit .....25. JUNIPERUS VIRGINIANA.
*c*². Valvate, thick, and only one pair fertile.....141. LIBOCEDRUS DECURRENS.
*c*³. Peltate, with edges joined, cones
d. Subglobose, short,
⅛ in. in diameter, scales usually 6 (*Chamæcyparis*) ....74. C. THYOIDES.
1 in or less in diameter; scales 15–20..... 119. TAXODIUM DISTICHUM.
*d*². Ovoid-oblong, scales diverging at right angles to axis and rhomboidal at apex; cones
2–3 in. long..... .....142. SEQUOIA GIGANTEA.
1 in. or less. . .....143. SEQUOIA SEMPERVIRENS.
*b*³. Differentiated into a fleshy covering or cup, with single erect seed.
c. With fleshy covering (drupe-like), sessile and
1 in. or slightly more long.....120. TORREYA TAXIFOLIA.
About 1½ in. long ..... 145. TORREYA CALIFORNICA.
*c*². Subtended by a red fleshy cup.....144. TAXUS BREVIFOLIA.

A KEY, BASED UPON THE LEAVES,

Designed as an Aid in identifying the Species represented in Parts I to VI inclusive, when out of season for procuring the Flowers.

N. B.—As this key applies only to the species thus far represented in AMERICAN WOODS it is important always to confirm identification by applying the more detailed description given in its proper place.

a. **Deciduous Leaves** — falling in autumn.
b. *Simple Leaves.*
c. Laminate — with well-marked blade and petiole.
d. Main rib single — pinnately veined.
e. Entire or nearly so, pointed at both ends and
f. Opposite
3–5 in. long, thick, lustrous above .... 9. NYSSA MULTIFORA.
5–6 in. long, thin, dull above.....89. CATALPA BIGNONIOIDES.
*f*². Alternate, and
g. Large, thinnish
Oblong, 5–10 in. long, petioles 1–2 in....1. MAGNOLIA ACUMINATA.
Obovate-lanceolate, 6–12 in. long, petiole scarcely ½ in.
76. ASIMINA TRILOBA.
*g*². Smaller, 2–7 in., thickish and with
h. Whitish pubescence at least on the veins beneath.
Petioles about 1 inch long .... .. 61. DIOSPYROS VIRGINIANA.
Petioles about ½ inch long.....110. NYSSA OGECHE.
*h*². Brownish pubescence on veins beneath, margins wavy
126. RHAMUNS PURSHIANA.
*f*³. Alternate opposite and scattered upon the same plant, linear.
134. CHILOPSIS SALIGNA.
*e*². Serrate, serulate or dentate.
f. Inequilateral and cordate or truncate at base.
g. Ovate-orbicular, large, 4–5 in. or more in length.
3. TILIA AMERICANA.
*g*². Ovate, long-taper-pointed from a broad base.
12. CELTIS OCCIDENTALIS.
*g*³. Ovate-oblong and
h. Very rough, especially above, rugose.....11. ULMUS FULVA.
*h*². Smoothish and
i. 2–4 in. long, fruit in
Fascicles.....33. ULMUS AMERICANA
Racemes.....34. ULMUS RACEMOSA.

*i*². 1–2 in. long and only slightly inequilateral.
114. PLANERA AQUATICA.
Flowers and fruit in fascicles..... ...33. ULMUS AMERICANA.
Flowers and fruit in racemes.....34. ULMUS RACEMOSA.

*f*². Equilateral and obtuse, rounded or cordated at base.
g. Veins straight or nearly so, leaves thinnish,
h. Ovate-oblong,
Coarsely serrate with remote teeth, one at the end of each vein, ciliate and covered with silky white hairs.
16. FAGUS FERRUGINEA.
Doubly and sharply serrate, nutlet inclosed in a papery sac.
41. OSTRYA VIRGINICA.
Unequally and sharply serrate, nutlet subtended by a leafy bract..... ...42. CARPINUS CAROLINIANA.
*h*². Ovate and
i. Finely and closely serrate, smooth, whitish and reticulate-veined beneath..... .....47. POPULUS BALSAMIFERA.
*i*². Doubly serrate and
j. Thinnish; petioles downy and of aromatic flavor.
Bark of trunk yellowish-gray .....17. BETULA LUTEA.
Bark reddish-brown .....44. BETULA LENTA.
*j*². Thickish and bark white .....43. BETULA PAPYRACEA.
*g*². Veins incurved.
h. Orbicular-heart-shaped, leaves thickish, 4–8 in. long.
Acuminate.....63. MORUS RUBRA.
Obtuse or rounded at apex .....97. POPULUS HETEROPHYLLA.
*h*². Orbicular-ovate; petioles laterally compressed,
Coarsely dentate.....18. POPULUS GRANDIDENTATA.
Serrate-dentate .....72. POPULUS TREMULOIDES.

*f*³. Equilateral and acute at base, tapering both ways.
g. Narrow-lanceolate, very long-attenuate, tomentose on midrib above and petiole.....45. SALIX NIGRA.
*g*². Ovate-lanceolate to lanceolate, long-acuminate, 2-4 in. long; capsules
Sessile or nearly so .....46. SALIX ALBA var. VITELLINA.
With slender pedicels..... .....71. SALIX AMYGDALOIDES.
*g*³. Oblong-lanceolate to lanceolate.
h. Minutely serrulate, 3-7 in. long; petioles downy.
140. SALIX LAEVIGATA.
*h*². Serrate with teeth sharply
Awn-pointed and in about 20 pairs.....40. CASTANEA VESCA.
Mucronate and in 6-12 pairs. ...68. QUERCUS MUHLENBERGII.
Finely glandular-serrate.... 55. PRUNUS PENNSYLVANICA.
*g*⁴. Obovate-oblong, serrate, hairy under surface...56. PRUNUS AVIUM.
*g*⁵. Ovate, very smooth and shining.... .....57. PYRUS COMMUNIS.
*g*⁶. Wedge-obovate, veins very prominent,
Thin, smoothish and dull above .....58. CRATAEGUS PUNCTATA.
Thick, smooth and lustrous above...85. CRATAEGUS CRUS-GALLI.
*g*⁷. Ovate-oblong, veins incurved and petioles
h. With 2–4 glands, smooth.....29. PRUNUS SEROTINA.

*h*². Without glands,
Glabrous both sides, sharply serrate.
59. AMELANCHIER CANADENSIS.
Downy under-side and petiole.....30. PYRUS MALUS.
*g*³. Lanceolate-oblong, 1–3 in. long, about equally acuminate at both ends.....111. FORESTINA ACUMINATA.
*f*⁴. Equilateral and truncate at base,
g. Serrate-dentate with cartilaginous teeth
Deltoid-ovate.....48. POPULUS MONILIFERA.
Broadly deltoid.....73. POPULUS DILATATA.
*g*². Irregularly serrate or obscurely lobed....70. BETULA POPULIFOLIA.
*e*³. Pinnately lobed; lobes
f. Rounded at apex (not bristle-pointed) and
g. Subequal.....38. QUERCUS ALBA.
*g*². Very unequal.
h. The two lobes next the summit much the largest.
92. QUERCUS OBTUSILOBA.
*h*². Lyrate-pinnatifid and sinuses extending
Nearly to the midrib and roundish..39. QUERCUS MACROCARPA.
Usually not over half-way to the midrib and more acute.
66. Q. BICOLOR.
*h*³. Irregularly lobed with broad lobes and narrow sinuses.
136. Q. GARRYANA.
*f*². Bristle-pointed; sinuses
g. Moderately deep and narrow, lobes broad.....15. QUERCUS RUBRA.
*g*². Deeper and broader; lobes narrower.....93. Q. TINCTORIA.
*g*³. Deep, broad and rounded; lobes very narrow; acorn
Ovoid-oblong, ½ immersed in a coarse-scaled cup.
69. QUERCUS COCCINEA.
Flatened-globular, ¼ immersed in a fine-scaled cup.
94. QUERCUS PALUSTRIS.
*e*⁴. Broad, truncate at both base and apex, and with two spreading lobes on each side.....2. LIRIODENDRON TULIPIFERA.
*e*⁵. Wavy and spinous-toothed, very thick.....52. ILEX OPACA.
*e*⁶. Undulately crenate-toothed; obovate-oblong,
Slightly if at all pubescent beneath.....67. QUERCUS PRINUS.
Velvety pubescent beneath.....116. QUERCUS MICHAUXII.
*e*⁷. Sinuate-toothed, white-tomentose beneath.....96. POPULUS ALBA.
*e*⁸. Cut-serrate or sublobate with slender petioles;
Ovate, coarsely cut-serrate.....83. PYRUS CORONARIA.
Round-ovate, finely cut-serrate.....86. CRATÆGUS COCCINEA.
*e*⁹. Crenate-serrate; petioles 1 in. or slightly less in length.
82. PRUNUS CERASUS.
*e*¹⁰. Obscurely crenulate-toothed; leaves
Alternate, petioles long, mostly 1½ in. or more.
87. CORNUS ALTERNIFOLIA.
Opposite, petioles short (less than 1 in.).....88. CORNUS FLORIDA.
*e*¹¹. Doubly crenate-serrate with glandular teeth.....81. PRUNUS NIGRA.
*e*¹². Doubly serrate, rhombic-ovate.....95. BETULA NIGRA.
*d*². Main ribs several, palmately-veined, etc.

e. Rib single at first but soon sending off a strong vein on each side and leaves 3-lobed, 2-lobed or entire. . . . . 32. SASSAFRAS OFFICINALE.

*e*². Ribs three at first, but soon five by branching, leaves alternate, base of petiole concave and fitting over the axillary bud.

Obscurely 3-5 lobed with broad shallow sinuses.
13. PLATANUS OCCIDENTALIS.

5-lobed with narrow and deeper sinuses..135. PLATANUS RACEMOSA.

*e*³. Ribs 5-7 from commencement; leaves

f. Opposite, base of petiole subtending (not covering) the axillary bud.

g. Moderately incised with broad lobes which are

Sparingly sinuate-toothed. . . . . .7. ACER SACCHARINUM.

Irregularly serrate and notched. . . . . .53. ACER RUBRUM.

Sharply and finely doubly serrate. . . .79. ACER PENNSYLVANICUM.

*f*². Alternate, tendril bearing vine. . . . . .78. VITIS AESTIVALIS.

g. Deeply incised with more or less acute sinuses and narrow divisions.

Star-shaped, lobes glandular serrate.
60. LIQUIDAMBAR STYRACIFLUA

Palmate, lobes incisely toothed. . . . . .26. ACER DASYCARPUM.

*c*². Linear, sessile in delicate 2-ranked sprays. . . . . .119. TAXODIUM DISTICHUM.

*c*³. Needle-shaped — without distinction of blade and petiole — short, about 1 in. in length, soft and in fascicles of many each. . . . . .23. LARIX AMERICANA.

*b*². *Compound leaves.*

c. Palmate with usually

7 obovate leaflets . . . . . .6. ÆSCULUS HIPPOCASTAUM.

5 oblong-lanceolate leaflets . . . . . .127. ÆSCULUS CALIFORNICA.

*c*². Pinnate and with an odd terminal leaflet, rachis

d. Finished with prickles. . . . . .106. XANTHOXYLUM CLAVA-HERCULIS.

*d*². Not-finished with prickles; leaflets all

e. Petiolulate, leaflets

f. 21–41, each with one or two pairs of glandular teeth at its base.
4. AILANTHUS GLANDULOSUS.

*f*². 11–15,

With prickle-like stipules, entire . . . . . 80. ROBINIA PSEUDACACIA.

With stipules, serrate. . . . . .84. PYRUS SAMBUCIFOLIA.

*f*³. 7–9, ovate or lance-oblong, entire or obscurely serrate;

Petioles and branchlets glabrous . . . . . .10. FRAXINUS AMERICANA.

Petioles and branchlets velvety pubescent.31. FRAXINUS PUBESCENS.

*f*⁴. Lateral leaflets

Petiolulate, irregularly toothed. . . . . .54. ACER NEGUNDO.

Sessile, subentire. . . . . .77. PTELEA TRIFOLIATA.

*e*². Sessile or subsessile

f. Numerous (15–17) and pubescent, especially along the petiole and rachis.

g. Leaflets ovate-lanceolate, finely serrate; pubescence of short, rust-colored clammy hairs.

Fruit subovoid, viscid-pubescent . . . . . 14. JUGLANS CINEREA.

Fruit globose, roughly dotted (not viscid-pubescent).
35. JUGLANS NIGRA.

*g*². Leaflets lance-oblong, coarsely serrate; pubescence of copious, longer and white hairs. . . . . .5. RHUS TYPHINA.

*f*². 11–13. . . . . .115. CARYA AQUATICA.

*f*³. (5–11).

g. 5, quite glabrous; fruit a ridged nut about 1 in. long with thick epicarp. 36. CARYA ALBA.

*g*². 5–7 or 9, glabrous, epicarp thin; nut
Small, thin-shelled .....91. CARYA MICROCARPA.
Larger, moderately thick-shelled.....85. CARYA PORCINA.

*g*³. 7–9, epicarp thick and woody, leaflets
Puberulent, bark shaggy ....64. CARYA SULCATA.
Tomentose and oderous.....90. CARYA TOMENTOSA.

*g*⁴. 7–11,
Lanceolate, acute at base, minutely glandular and pubescent beneath ..... 37. C. AMARA.
Oblong-lanceolate, glabrous, obtuse or rounded at base ; fruit a samara, flat at base.....62. FRAXINUS SAMBUCIFOLIA.

*b*³. *Decompound Leaves.*

c. Petioles smooth or pubescent; leaves

d. Regularly bipinnate; pinnæ

e. 2, leaflets,
4–6, small (2–3 lines long).....128. CERCIDUM TORREYANUM.
12–30 or more, 1–2 in. long.....129. PROSOPIS JULIFLORA.

e.² 7, leaflets, sessile.....105. MELIA AZEDARACH.

*d*². Regularly bipinnate excepting for the lowest pair of single leaflets; leaflets stalked ..... 27. GYMNOCLADUS CANADENSIS.

*d*³. Irregularly bipinnate, leaflets small and sessile,
12-18 in number.....109. GLEDITSCHIA MONOSPERMA.
18-24 in number .....27. GLEDITSCHIA TRIACANTHOS.

*c*². Petioles prickly, leaves large, with ovate, sessile, serrate leaflets. 8. ARALIA SPINOSA.

*a*². **Subdeciduous Leaves** — a part only of the leaves falling in autumn, the rest remaining green through the winter.
Obovate-spatulate, entire, shining green both sides ..118. QUERCUS AQUATICA.

*a*³. **Persistent Leaves** — evergreen.

b. Needle-shaped and quite stiff, pointing every way.

c. In fascicles (*Pinus*) of

d. Two each, a membraneous sheath inclosing the base of each fascicle, about

e. 1 in. long, sheathes very short ..... 99. P. BANKSIANA.

*e*². 1½–2½ in. long and
Stout; sheaths ⅛ in. or less; branchlets smooth and purple 98. P. INOPS.
Slender ⅛ in. or more; branchlets rough-scaly.....148. P. CONTORTA.

*e*³. 2–3 in. long, slender with short sheaths .....122. P. CLAUSA.

*e*⁴. 3–5 in. long, slender; branchlets
Rough.. .....75. P. MITIS.
Smooth .....123. P. GLABRA.

*e*⁵. 5–6 in. long, thicker, sheaths elongated.....19. P. RESINOSA.

*d*². Three each and
3–6 in. long ....50. P. RIGIDA.
5–8 in. long.... .... 121. P. SEROTINA.
7–10 in. long, very stout .....147. P. PONDEROSA.
8–15 in. long.....123. P. PALUSTRIS.

*d*³. Both two and three each ....125. P. CUBENSIS.

*d*⁴. Five each, 3–5 in. long, sheath deciduous,
Very slender: cones 4–6 in. long..... ....49. P. STROBUS.
Rather stout, cones 10–18 inches long.....146. P. LAMBERTIANA.

*c*². Not in fascicles (scattered), ridged above and below and with elevated persistent bases, 4 angled and

d. 4-sided ; branchlets
Pubescent.....20. PICEA NIGRA.
Glabrous.....100. PICEA ALBA.
*d*². Flat ; branchlets smooth ; cones cylindrical.....149. PICEA SITCHENSIS.
*b*². Linear, flat and
c. Conspicuously 2-ranked (diverging in two directions),
d. Petioled and margin
Obscurely denticulate, 8 lines or less in length....21. TSUGA CANADENSIS.
Entire, revolute, ½–1 inch in length.....144. TAXUS BREVIFOLIA.
*d*². Subsessile rigid and sharply bristle-pointed, about 1 inch long and generally tapering from wide base.....120. TORREYA TAXIFOLIA.
1–3 inches long, of more nearly uniform width
145. TORREYA CALIFORNICA.
*d*³. Sessile, entire, ½–¾ inches long, keeled below
Narrow-linear, obtusely pointed..... 22. ABIES BALSAMEA.
Wide-linear, pungent at apex.....143. SEQUOIA SEMPERVIRENS.
*c*². Somewhat 2-ranked, short petiolate.....150. PSEUDOTSUGA TAXIFOLIA.
*b*³. Scale like or awl-shaped, inbricated and closely appressed
c. In 4 ranks and making a conspicuously
Flat two-edged branchlet.....24. THUYA OCCIDENTALIS,
Flattish but narrower branchlet... ... ...141. LIBOCEDRUS DECURRENS.
4-angled rather than flat branchlet ; fruit a
Small spherical cone .....74. CHAMÆCYPAIS THYOIDES.
Bluish berry..... .....25. JUNIPERUS VIRGINIANA.
*c*². Scattered or spirallay arranged, mostly carminate ..142. SEQUOIA GIGANTEA.
*b*⁴. Laminate and ovate to obovate
c. ½–1½ in. long, serrate above, entire at base..130. CERCOCARPUS PARVIFOLIUS.
*c*². 1–5 in. long,
d. Rounded or truncate at base,
e. Pale glaucous beneath, darker above, 3-5 in long, entire, flat.
132. ARBUTUS MENZIESII.
*e*². Tomentose and concave beneath, margin
Serrate-dentate ....138. QUERCUS DENSIFLORA.
Entire and undulate..... . .....131. GARRYA ELLIPTICA.
*d*². Cuneate at base, glabrous or nearly so beneath, flat.
117. QUERCUS VIRENS.
*c*³. 6–12 in. long, thick, entire, acute at both ends.
101. MAGNOLIA GRANDIFLORA.
*c*⁴. 3–6 in. long, blade articulated to the petiole which is
Conspicuously winged; stamens usually 20..... 103. CITRUS AURANTIUM.
Slightly if at all winged; stamens usually 35.....104. CITRUS LIMONUM.
*b*⁵. Lanceolate-oblong.
c. 3–5 in. long, margin
d. Crenate-serrate..... 102. GORDONIA LASIANTHUS.
*d*². Entire and leaves
e. Opposite, glabrous beneath .... .112. OSMANTHUS AMERICANUS.
*e*². Alternate and beneath
Rusty-pubescent ... . 113. PERSEA CAROLINENSIS var. PALUSTRIS.
Golden-scurfy beneath.....139. CASTANOPSIS CHRYSOPHYLLA.
*c*². 2 in. long, entire, glandular beneath .....108. CLIFTONIA LIGUSTRINA.
*b*⁶. Oblong or elliptical, small, 1½–4 in.....117. QUERCUS VIRENS.
*a*⁴. **Leaves Subpersistent** — Evergreen southward, but more or less deciduous northward, or individual trees shedding their leaves while most of the trees do not.
Narrow obovate; 1–3 in. long.....107. CYRILLA RACEMIFLORA.
Lanceolate to oval, 3–6 in. long, glaucous beneath....51. MAGNOLIA GLAUCA.
Orbicular-oblong, sinuately spinous-toothed.....137. QUERCUS AGRIFOLIA.

A KEY, BASED UPON THE FRUIT,

Designed as an Aid in identifying the Species represented in Parts I–VI, inclusive, when in Season for procuring the Fruit.

N. B.— The remarks concerning the use of the Key based upon the Leaves are equally true with reference to this.

a. **Free Fruit** — formed by the ripening of a single pistil either simple or compound.

b. *Indehiscent pericarp.*

c. Samara — dry, usually 1-celled, 1-seeded and with 1-2 membranous wings.

d. In terminal panicles; wing somewhat oblong-lanceolate, with a lenticular seed at about its center, and beyond which the wing is twisted (*Ailanthus*)... .....4. A. GLANDULOSUS.

d². In terminal cymes, a 2-seeded suborbicular samara, winged all around. 77. PTELEA TRIFOLIATA.

d³. In umbellate corymbs, each pedicel supporting a pair of samaræ with oblanceolate wings, obtuse at the apex and with main rib on outer margin (*Acer*).

e. Fruit maturing in the fall, wings slightly divergent..7. A. SACCHARINUM.

e². Fruit maturing in early summer.

f. Large 1¼ in. or more, downy when young.. .....26. A. DASYCARPUM.

f². Smaller, smooth, pendulous and

Red, in umbels.....53. A. RUBRUM.

Greenish in racemes, wings incurved.....54. A. NEGUNDO.

d⁴. In terminal racemes, 2 samaræ on a single pedicel with main rib on outer margin.....79. ACER PENNSYLVANICUM.

d⁵. In axillary racemes or panicles, winged at the apex with a more or less lanceolate obtuse wing (*Fraxinus*).

e. Terete at base (seed-bearing portion); branchlets and petioles

Smooth .....10. F. AMERICANA.

Velvety pubescent .....31. F. PUBESCENS.

e². Flat — wing extending along the seed-bearing portion. 62. F. SAMBUCIFOLIA.

d⁶. In lateral fascicles or clusters, winged all round (*Ulmus*).

Sessile or nearly so, cell pubescent and margin not ciliate..11. U. FULVA.

In fascicles, cell smooth, margin densely ciliate.....33. U. AMERICANA.

In racemes, cell pubescent, margin ciliate.....34. U. RACEMOSA.

c². Drupe or drupe-like and with a single seed.

d. Fibro-fleshy and dryish pericarp

e. Small, subglobose (*Rhus*), in terminal thyrses and clothed with crimson, acid hairs.....5. RHUS TYPHINA.

e^2. Large, about 2 in. in length, with edible embyro (*Juglans*).
Ovoid or oblong and clothed with brownish, fragrant-viscid hairs.
14. J. CINEREA.
Globose, roughly dotted (not viscid hairy).....35. J. NIGRA.
d^2. Fleshy pericarp.
e. Ovoid and
f. Clustered on axillary peduncles.
g. On the growth of the season, clustered 2 or 3 together, about $2\frac{1}{2}$ in. long, blue and
Sessile upon the peduncle ; stone longitudinally striated.
9. NYSSA MULTIFLORA.
With short pedicels ; stone not striated.
113. PERSEA CAROLINENSIS var PALUSTRIS.
g^2. On growth of the previous season....111. FORESTIERA ACUMINATA.
f^2. Racemed, bluish and with short, fleshy, red pedicels.
32. SASSAFRAS OFFICINALE.
e^2. Ovoid-oblong, 1–$1\frac{1}{4}$ in. long, stone compressed.....81. PRUNUS NIGRA.
e^3. Oblong, tipped with the remnants of the style and about 1 in. in length.
Reddish and stone longitudinally striated with membranous-edged ridges.....110. NYSSA OGECHE.
Dark blue, stone not membranous-ridged.
112. OSMANTHUS AMERICANUS.
e^4. Globular,
f. Purple or purplish black and
g. Solitary, of a sweet sugary flavor.....12. CELTIS OCCIDENTALIS.
g^2. Racemed (or partially so), of a vinous, slightly astringent flavor.
29. PRUNUS SEROTINA.
g^3. In umbels, larger, of
Acid-vinous flavor, $\frac{1}{2}$ in. in diameter.....82. PRUNUS CERASUS.
Sweet-vinous flavor, $\frac{3}{4}$ in. in diameter.....56. PRUNUS AVIUM.
f^2. Red, small and very sour.....55. P. PENNSYLVANICA.
c^2. Drupe-like but containing more than one seed, and seeds
d. Inclosed in a bony
e. 2–3–celled stone
Blue, subglobose, in flat-cymes with red stems.
87. CORNUS ALTERNIFOLIA.
Bright-red, elongated, sessile upon an orange-colored disk.
88. CORNUS FLORIDA.
e^2. 3–5–celled stone; yellowish-white, in loose axillary panicles.
105. MELIA AZEDARACH.
d^2. Distinct, (not inclosed in a common stone) ; fruit
e. Crowned with persistent
f. Calyx-teeth,
Purple-black, 5–seeded, in umbels..... .....8. ARALIA SPINOSA.
Red or purplish, 4–8–seeded, axillary.....52. ILEX OPACA.
f^2. Style ; drupe small about $\frac{1}{3}$ in..... ...107. CYRILLA RACEMIFLORA.
e^2. Not crowned with either calyx-teeth or style.
Dark blue, scaly bracted beneath.....25. JUNIPERUS VIRGINIANA.
Black, more or less 2–3 lobed and 2–3 seeded.
126. RHAMNUS PURSHIANA.

*c*⁴. Nut—hard, single coat and furnished with an involucral cup or covering,
d. Ovoid oblong or ellipsoidal, surrounded at its base with an involucral cup (*Quercus*), acorn borne
e. On the new wood of the season, cup
f. Less than ¼ enveloping the oval acorn.....136. QUERCUS GARRYANA.
*f*². About ¼ enveloping the small, ovoid nut; scales thin and appressed. 68. Q. MUHLENBERGII.
*f*³. About ½ enveloping the nut
g. Thick, scales very roughly tubercled, edge of cup rather inturned after shedding the nut; nut usually long-ovoid .....38. Q. ALBA.
*g*². Thinner, scales thinnish; leaves
Deciduous; peduncles shorter than petioles. 67. QUERCUS PRINUS.
Subpersistent; acorns sessile or nearly so. 137. QUERCUS AGRIFOLIA.
*f*⁴. Scarcely ¼ enveloping the oblong-ovoid nut about 1¼ in. in length. 116. QUERCUS MICHAUXII.
*f*⁵. About ½ or more enveloping the nut; peduncles longer than the petioles; nut
¾ in. long, light-brown .....66. QUERCUS BICOLOR.
½ in. or less long, dark brown .....117. QUERCUS VIRENS.
*f*⁶. About ½ or more enveloping the nut; peduncles
g. Longer than the petioles .....66. Q. BICOLOR.
*g*². Shorter than the petioles; scales
Very loosely appressed, forming a moss-like fringed margin of cup .....39. Q. MACROCARPA.
More closely appressed and not forming a moss-like fringe. 92. Q. OBTUSILOBA.
*e*². On wood of the preceding season (subgenus *Melanobalanus*); cup
f. Very shallow, almost flat and with long-linear recurved scales. 138. QUERCUS DENSIFLORA.
*f*². Saucer-shaped, ¼ enveloping the nut, which is
g. Ovoid-oblong, about 1 in. long.....15. Q. RUBRA.
*g*². Flattened-globose; leaves
Sinuate-pinnatifid with wide sinuses....94. QUERCUS PALUSTRIS.
Obovate-spatulate, entire.....118. QUERCUS AQUATICA.
*f*³. Top-shaped, ½ enveloping the acorn; scales thin and coarse
Inner bark of tree reddish .....69. Q. COCCINEA.
Inner bark yellowish .....93. Q. TINCTORIA.
*d*². Club-shaped, short, surrounded with stiff hairs, tipped with the persistent recurved style and arranged in globular heads, which are
Solitary .....13. PLATANUS OCCIDENTALIS.
2–7 together in a moniliform spike .....135 PLATANUS RACEMOSA.
*d*³. Achenium-like, small and borne in short catkins,
Inclosed in a membranous inflated sac, catkin hop-like. 41. OSTRYA VIRGINICA.
Subtended by an enlarged leafy bract ....42. CARPINUS CAROLINIANA.
*c*⁵. Nut-like, dry, not invested with an involucre.
Smoothish, globose, about ¼ in. in diameter, in cymes with leaf-like bract attached.....3. TILIA AMERICANA.
Rough, with scale-like points, ovate, coriacious. .114. PLANERA AQUATICA.

c^6. Pod (legume) which is
d. Oblong, flat, about 2 in. broad and curved.
27. GYMNOCLADUS CANADENSIS.
d^2. Linear or nearly so
10-18 in. long, contorted and twisted...28. GLEDITSCHIA TRIACANTHOS.
4-6 in. long, subterete, compressed between the seeds and thick-valved.
129. PROSOPSIS JULIFLORA
3–4 in. long, 2–8-seeded and thin valved..128. CERCIDIUM TORREYANUM.
d^3. Obliquely ovate (1–2 in. long), long stalked and mostly 1-seeded.
109. GLEDITSCHIA MONOSPERMA.
c^7. Pome; capsules
d. Cartilaginous; fruit
e. Sunken at insertion of pedicel,
f. Globular
Large, 1 in. or more, distinctly 5-celled.....30. PYRUS MALUS.
Small, more or less 10-celled.....59. AMELANCHIER CANADENSIS.
f^2. Flattened-globose, waxy, fragrant and very tart.
83. PYRUS CORONARIA.
e^2. Not sunken at insertion of pedicel, pyriform .....57. PYRUS COMMUNIS.
d^2. Not cartilaginous, 1-5 bony seeds.
$\frac{3}{4}$ in. in diameter, red or yellow with white spots.
58. CRATAEGUS PUNCTATA.
$\frac{1}{2}$ in. in diameter, leaves round-ovate .....86. CRATAEGUS COCCINEA.
$\frac{1}{3}$ in. in diameter, leaves wedge-obovate...85. CRATAEGUS CRUS-GALLI.
c^8. Berry.
d. With persistent thickish calyx-lobes large (about 1 in. or more).
61. DIOSPYROS VIRGINIANA.
d^2. Without persistent calyx-lobes and smaller
e. In thyrses.... ..... .78. VITIS ÆSTIVALIS.
e^2. In compact-racemes and
Hoary-tomentose ....131. GARRYA ELLIPTICA.
Smooth and flattened globose.... ....133. ARCHSTAPHYLOS PUNGENS.
e^3. In open panicles ....132. ARBUTUS MENZIESII.
c^9. Fleshy with custard-like edible pulp.....76. ASIMINA TRILOBA.
c^{10}. Berry-like pome, $\frac{3}{8}$ in. in diameter and borne in dense clusters.
84. PYRUS SAMBUCIFOLIA.
c^{11}. Hesperidum — seeds in juicy pulp and rind leathery.
Subglobose, flattened at the ends .....103. CITRUS AURANTIUM.
Globose-oblong, mammillate at the extremity ....104. CITRUS LIMONUM.
c^{12}. Achenium.
3–4–angled and with membranous wing like margins.
108. CLIFTONIA LIGUSTRINA.
Linear-oblong, tipped wiih the prolonged tail-like style.
130. CERCOCARPUS PARVIFOLIUS.
b^2 *Dehiscent pericarp.*
c. Subglobose, and
d. Coriaceous or woody, dehiscent by
e. 2–3 valves and containing one or very few large seeds with smooth shining coat and a large scar (*Æsculus*), fruit
Prickly and leaflets 7..... ..6. ÆSCULUS HIPPOCASTANUM.
Smooth and leaflets 5.....127. ÆSCULUS CALIFORNICA.

e[3]. 4 more or less distinct valves (*Carya*).

f. Epicarp thick and separating quite freely to the base; nut ridged with thick shell, globular-ovoid and

g. Flattened.

1 in. or less in length.....36. CARYA ALBA.

1¼ in. or more in length.....64. CARYA SULCATA.

g[2] Not so much flattened, usually 4 angled.

90. CARYA TOMENTOSA.

f[1]. Epicarp only moderately thick and nut of medium size, moderately ridged and with shell of medium thickness.

65. CARYA PORCINA.

f[2]. Epicarp thin, nuts small and thin-shelled; kernel

g. Astringent and bitter; sutures of epicarp very prominent; nut Quite smooth, whitish and only slighly compressed.

37. CARYA AMARA.

Rough, reddish, strongly compressed and angled.

115. CARYA AQUATICA.

g[2]. Slightly if at all bitter, nut whitish and sutures moderately prominent.....91. CARYA MICROCARPA.

d[2] Covered with spines; dehiscent

e. By four valves; nuts

Sharply 3-angled, 2 together, involucre soft-prickly.

16. FAGUS FERRUGINEA.

Subovoid, flattened, 1–3 together, involucral spines very sharp and hard.

40. CASTANEA VESCA.

e[2] Irregularly; spines many-branched; nut maturing the second year.

139. CASTANOPSIS CHRYSOPHYLLA.

c[2] Small, ovoid-lanceolate pods arranged in catkins, opening by two valves and containing numerous seeds furnished with silky down; leaves

d. Orbicular-ovate; petioles flattened; leaves

Dentate.....18. POPULUS GRANDIDENTATA.

Finely serrate, sharply pointed.....72. P. TREMULOIDES.

Sinuate-toothed, tomentose beneath.....96. P. ALBA.

Obscurely-serrate, with obtuse or rounded apex. 97. P. HETEROPHYLLA.

d[2] Ovate, closely serrate, whitish and reticulate-veined beneath.

47. P. BALSAMIFERA.

d[3] Deltoid-ovate.....48. P. MONILIFERA.

d[4] Broadly deltoid.....73. P. DILATATA.

d[5] Linear-lanceolate, tomentose on midrib above and petiole.

45. SALIX NIGRA

d[6] Lanceolate or elliptic-lanceolate, smooth above; capsules

e. Sessile or nearly so.....46. SALIX ALBA var. VITELLINA.

e[2] With slender pedicels; leaves

2–4 in. long.....71. SALIX AMYGDALOIDES.

3–7 in. long.....140. SALIX LAEVIGATA.

c[3]. Linear compressed pods, opening by two valves.

80. ROBINIA PSEUDACACIA.

c[4]. Subcylindrical pods, long, opening by two valves.

6–10 in. long, ¼ in. or less thick.....134. CHILOPSIS SALIGNA.

10–12 in. or more long, ½ in. or more thick...89. CATALPA BIGNONIOIDES.

*c*⁵. Ovoid, 5-valved capsule .....102. GORDONIA LASIANTHUS.

*c*⁶. Subovoid follicle with seeds suspended by funiculi when ripe.
106. XANTHOXYLUM CLAVA-HERCULIS.

*a*². **Aggregated fruit** — composed of many carpels, either closed or opened and cohering or closely massed together, forming a

b. Cone.

c. Scales of the cone open carpels (*Coniferæ*).

d. Scales many and spreading at maturity.

e. Imbricated and each subtended by a bract; ovules 2, inverted, and

f. Maturing the year after flowering (*Pinus*); cones

g. Subterminal and scales

h. Thin at tip and unarmed; cones sub-cylindric and
4–6 in. long.....49. P. STROBUS.
12–18 in. long.....146. P. LAMBERTIANA.

*h*². Thickened at tip and

i. Armed with a recurved prickle.

j. 1–3 in. long, cylindric ovid, oblique.....148. P. CONTORTA.

*j*². 3–6 in. long, glossy-brown, separating from the tree by a fracture
Within the peduncle.....125. P. CUBENSIS.
Within the base of cone.....147. P. PONDEROSA.

*j*³. 6–10 in. long..... ....124. P. PALUSTRIS.

*i*². Unarmed cones about 2 in. in length, straight...19. P. RESINOSA.

*g*². Lateral and scales thickened at tip; cones

h. Ovid-oblong; leaves 3–5 in. long; scales armed with a weak prickle directed
At about right angles from the axis of the cone....75. P. MITIS.
Forward, at about 45° or less from the axis. . 123. P. GLABRA.

*h*². Ovoid-pyramidal.

i. Prickles strong; cones 2 in. or
Rather less in length; leaves 1½–3 in. long; branchlets purple.
98. P. INOPS.
Rather more; leaves 3–5 in. long.....50. P. RIGIDA.

*i*². Prickles weak; cones 2–3 in. long, and
Wide-pyramidal; leaves in 3's.....121. P. SEROTINA.
Narrow-pyramidal; leaves in 2's.....122. P. CLAUSA.

*h*³. Ovoid-acuminate, less than 2 in. long and scales unarmed.
99. P. BANKSIANA.

*e*². Valvate, bractless, wedge-shaped, spreading, each with 3–7 inverted ovules; cone woody oval and
2–3 in. long, scales usually 25–30.....142. SEQUOIA GIGANTEA.
1 in. or less, scales short, 20.....143. SEQUOIA SEMPERVIRENS.

*e*³. Maturing the first season — the autumn after blossoming.

f. Ovoid or oblong, ¼ in. long, pendent; bracts inconspicuous; scales persistent on the axis, thin and with eroded tip .....20. PICEA NIGRA.

*f*². Ovoid, small (8 lines or less), pendent, scales rounded and entire at tip.
21. TSUGA CANADENSIS.

*f*³. Cyclindrical,
Erect, large (2–4 in.), and scales finally falling away from the axis.
22. ABIES BALSAMEA.

Nodding, small (about 2 in.) scales persisting on the axis and entire at tip..... .....100. PICEA ALBA.

Pendent, 1½–3 in. long, scales incisely-denticulate.
149. PICEA SITCHENSIS.

*f*⁴. Cylindrical-oblong, 2–3 in. long; bracts much exserted.
150. PSEUDOTSUGA TAXIFOLIA.

*f*⁵. Ovoid or roundish, small, 9 lines or less, scales persistent on the axis at maturity.....23. LARIX AMERICANA.

*d*². Scales few, persistent, bractless; cone

e. Oblong and erect, with scales more or less thickened.

Loosely imbricated, 8–12, thinnish .....24. THUYA OCCIDENTALIS.

Valvate, 4–6, thick, only two scales fertile.
141. LIBOCEDRUS DECURRENS.

*e*². Spherical, about ⅓ in. in diameter, with 3 pairs of peltate scales.
74. CHAMAECYPARIS THYOIDES.

*d*³. Scales not spreading at maturity but breaking irregularly; cones globose.
119. TAXODIUM DISTICHUM.

*c*². Scales 3-lobed bracts, each subtending 2–3 closed, indehiscent carpels—miniature samaræ (*Betula*).

f. Cones erect,

Sessile, ovoid-oblong, 1 in. in length ... .17. BETULA LUTEA.

With downy peduncle, ovoid, smaller .....95. BETULA NIGRA.

*f*². Cones suberect, ovoid-oblong; scales thicker and with short divergent lobes: wing of nutlet not broader than the body .....44. B. LENTA.

*f*³. Cones pendent, cyclindrical and about

1 in. in length .....70. B. POPULIFOLIA.

1⅜ in. in length..... ...43. B. PAPYRACEA.

*c*³. Scales closed carpels, growing from an elongated receptacle and consolidated together.

d. Dehiscent at maturity along the medium line of the back, and letting out each 1–2 berry-like seeds suspended by extensile threads (*Magnolia*); cone

Cyclindrical, curved, 2–3 in. long .....1. MAGNOLIA ACUMINATA.

Oblong, 1–1½ in. long ....51. MAGNOLIA GLAUCA.

Oval, 3–4 in. long..... .....101. MAGNOLIA GRANDIFLORA.

*d*². Indehiscent at maturity and falling away as samaræ.
2. LIRIODENDRON TULIPIFERA.

*b*². Spherical head, hardened and bristling with 2-beaked capsules.
60. LIQUIDAMBAR STYRACIFLUA.

*b*³. Sorosis—a spike with bracts and calyx-lobes all thickened and succulent.
63. MORUS RUBRA.

*a*³. **A naked seed,** subtended or surrounded by a fleshy disk.

b. Drupe-like, with fleshy covering, sessile, scaly-bracted beneath and about

1 in. in length, oval ... .120. TORREYA TAXIFOLIA.

1½ in length, obovoid..... ....145. TORREYA CALIFORNICA.

*b*². Bony seed, subtended by a fleshy cup..... ...144 TAXUS BREVIFOLIA.

A SYSTEMATIC STUDY

OF THE

Species whose Woods are Represented in the Accompanying Sections.

The timbers comprised in the series, which this text is designed to accompany, belong to what are known, botanically speaking, as *Flowering* and *Exogenous Plants*. At the outset, therefore, we will, once for all, define these groups; and, as the characters herein given are equally true of all the species enumerated in the following pages, they need not be repeated in the further definition of the various sub-groups and species.

FLOWERING or PHÆNOGAMOUS PLANTS.

Vegetables producing flowers which consist essentially of stamens and pistils, the latter bearing ovules or seeds.

In distinction from the *Flowering plants* are the *Flowerless* or *Cryptogamous Plants*, comprising the rest of the vegetable kingdom, from the very simply organized Slime Moulds and Bacteria up to the highly organized Ferns and Club-Mosses. But in the study of timbers this group is unimportant, as only in a few rare cases do any of its representatives attain the dimensions of trees. Those exceptions are the Tree-Ferns of tropical countries — gigantic ferns, which sometimes attain the height of fifty or sixty feet, with straight shafts quite like tree trunks and tops consisting of a bunch of enormous plume-like fronds. They, however, are of practically no value as timber.

EXOGENOUS or DICOTYLEDONOUS PLANTS.

Flowering plants whose stems consist of a central column of pith surrounded by wood in concentric layers, and this in turn by bark; the stems increasing in thickness by the addition of a new layer each year to the wood externally and to the bark internally. Leaves mostly netted-veined. First leaves of the embryo (cotyledons) two and opposite, or (in the Coniferæ) several in a whorl. Parts of the flower in fours or fives, very rarely in threes.

A second class of *Flowering Plants* and comprising the rest of the group is the *Endogenous* or *Monocotyledonous Plants*, characterized by having stems in which the

wood occurs as threads or bundles running through a cellular, pith-like tissue so that a transverse section exhibits the wood as dots and not in concentric rings. Leaves mostly parallel-veined. Embryo with single cotyledon, or rarely two, and then alternate and unequal. Parts of the flower generally in threes. In southern United States and elsewhere in or near the tropics trees are found, such as the Palms, etc., which belong to this class, but none we have to do with at present.

Exogenous plants are subdivided into two well-marked groups or sub-classes — *Angiospermæ* and *Gymnospermæ*. The former includes by far the greater part of the Flowering Plants, and most of the species represented in "American Woods" are representatives of it.

ANGIOSPERMÆ.

Flowering, exogenous plants in which there is a complete pistil — with stigma and closed ovary — containing ovules which develop into seeds at maturity. This sub-class comprises many groups of plants known as *Orders*, and such as are represented by plants which attain the dimensions of trees, within the limits of the United States, we propose to consider in the following pages:

ORDER **RHAMNACEÆ**: BUCKTHORN FAMILY.

Leaves simple, mostly alternate and with stipules small or wanting. *Flowers* small, often polygamous and sometimes dioecious; sepals valvate in aestivation, small, distinct, concave and involute in the bud or wanting; stamens as many as the petals and opposite them, inserted with them in the edge of a perigynous disk lining the calyx-tube, short and sometimes connected with the lower part of the ovary; pistil solitary, with mostly superior ovary, 2-5-celled, each cell with a single erect anatropous ovule; stigmas 2-5. *Fruit* a drupe or pod with one seed in each cell and not arilled; embryo large with broad cotyledons and sparing fleshy albumen.

Order represented by small trees and shrubs of warm and temperate countries, with slightly bitter juice and often nauseous or purgative fruits.

GENUS RHAMNUS, LINNEUS.

Leaves mostly alternate, pinnately veined, entire or dentate, petiolate, conduplicate in vernation; stipules small and deciduous. *Flowers* small, greenish, in axillary racemes or cymes, polygamous or dioecious; calyx campanulate, the tube lined with the disk, 4-5-cleft, the lobes keeled within and deciduous; petals small, with short claw, more or less notched at apex and turned in around the stamens, deciduous; stamens with very short subulate filaments and introrse 2-celled anthers opening lengthwise; pistil free, with 2-4-lobed stigma and 2 4-celled ovary, each cell containing a solitary, erect, anatropous ovule. *Fruit* a globose or oblong, blackish, berry-like drupe, with fleshy epicarp, and containing 2-4 cartilaginous, 1-seeded nutlets; seeds longitudinally grooved on the back.

Trees and shrubs of considerable economic importance, and the name Rhamnus is the classical Greek name, *ῥάμνος*, of the European Buckthorn.

126. RHAMNUS PURSHIANA, DC.

Bearberry, Sacred-bark Buckthorn, Shittim-wood, Wild Cherry.

Ger., *Kreuzdorn von Pursh;* Fr., *Nerprun de Pursh;* Sp., *Cascara Sagrada.*

Specific Characters:—*Leaves* deciduous, elliptical to obovate, prominently veined, 2-7 in. long, mostly acute at apex and obtuse rounded or subcordate at base, serrulate to nearly entire with wavy margins, with scattering hairs beneath and along the veins above; petioles scarcely ½ in. in length, and as with the new growths clothed in a brownish pubescence; stipules early deciduous. *Flowers* mostly perfect, 5-numerous, with peduncles longer than the petioles, in umbellate cymes; calyx with acuminate lobes; petals minute and bifid at apex, hood-shaped and enveloping the short stamens. *Fruit* black at maturity, globose-obovid, scarcely ¼ in. long, more or less 2-3-lobed, with thin flesh and containing 2-3 obovate nutlets rounded on the back. (The specific name, *Purshiana*, is in compliment to Frederick Pursh, who first discovered the species.)

A small tree occasionally attaining the height of 40 ft. (12 m.) and 18 in. (0.45 m.) diameter of trunk, with large branches and full rounded top. The bark of trunk is of a bluish-gray color mottled with whitish, quite smooth and slightly checked longitudinally. It considerably resembles the bark of the beech in the east.

Habitat.— From the vicinity of Puget Sound southward to Lower California and eastward into Montana, Colorado and Texas, on slopes and uplands, often in the shade of other trees, and attaining its best development in northern California and western Oregon. In many localities it is no more than a large shrub.

Physical Properties.— Wood rather light, hard, close-grained, compact, satiny, susceptible of a smooth polish, and with numerous fine medullary rays. It is of a light yellowish-brown color, streaked with purplish-brown, and with light yellow sap-wood. *Specific Gravity,* 0.5672; *Percentage of Ash,* 0.67; *Relative Approximate Fuel Value,* 0.5634; *Coefficient of Elasticity,* 91268; *Modulus of Rupture,* 750; *Resistance to Longitudinal Pressure,* 621; *Resistance to Indentation,* 192; *Weight of a Cubic Foot in Pounds,* 35.35.

Uses.— Little, if any, use is made of the wood of this tree, but its bark is a very important product on account of its medicinal properties.

Medicinal Properties.— The bark of this tree is considered an excellent cathartic medicine, and is extensively administered in the form of extracts and tinctures.

Order **SAPINDACEÆ**: Soapberry Family.

Leaves simple or compound. *Flowers* polypetalous, often irregular and mostly symmetrical; sepals and petals each 4–5, imbricated in the bud, the petals inserted with the 5–10 stamens on a perigynous or hypogynous disk; ovary 2–3-celled and lobed, usually 1–2 ovules in each cell, embryo mostly convoluted; no albumen. *Fruit* a membranous, inflated pod, a leathery thick subspherical pod with nut-like seeds, or a winged samara.

GENUS ÆSCULUS, L.

Leaves opposite, digitately compound, destitute of stipules; leaflets serrate and straight-veined. *Flowers* paniculate, terminal, unsymmetrical, irregular, often polygamous; pedicels jointed; calyx tubular, 5-toothed, often rather gibbous at the base; corrolla irregular, 4- or sometimes 5-petaled, nearly hypogynous; stamens 6–8, usually 7, distinct and often unequal, with long and slender filaments; style 1, filiform; ovary 3-celled, with 2 ovules in each cell, only one of which, or one in each cell, comes to maturity. *Fruit* roundish, coriaceous, dehiscent, 2-3-valved, containing 1-3 large, smooth, leathery and shining seeds, each with a large, pale scar; cotyledons thick, bulky and inseparable, rich in starch, but of bitter taste, remaining underground in germination.

(*Aesculus* is a Latin name, but in ancient times applied to a kind of oak.)

127. ÆSCULUS CALIFORNICA, NUTT.

CALIFORNIA BUCKEYE.

Ger., *Californianische Roszkastanie;* Fr., *Marronier de Californie;* Sp., *Esculo Californiano.*

SPECIFIC CHARACTERS.— *Leaves* of 4-7 (usually 5) leaflets slender petiole 3-4 in. long, leaflets oblong-lanceolate, 4-6 in. long, smooth, acute at apex, obtuse or rounded at base, sharply serrate, with slender petiolules, ½ in. or less in length, early deciduous, sometimes even falling before midsummer. *Flowers* May to July, about 1 in. or slightly more in length, with short pedicels, in close long-stemmed pubescent thyrses 6-12 in. in length, white or rose-colored; calyx 2-lobed, very slightly toothed; petals narrow-oblong, slightly unequal; stamens 5-7, with long slender filaments and orange-colored anthers; pistil with ovary densely pubescent. *Fruit* pear-shaped, with thin unarmed brown valves, with slender stem and usually containing one large subglobose seed 1-2 in. long.

Usually a small tree, and often scarcely more than a shrub, but occasionally attaining the height of 30 or 40 ft. (10 m.) and with a short trunk 2 or 3 ft. (0.90 m.) in diameter, but with a wide base 5-6 ft. (1.75 m.) across at the surface of the ground. It is covered with a brownish-gray bark quite smooth until old and then flaking off in irregular scales. The top of the tree is wide and rounded with a symmetry suggestive of its having been trimmed, and consists of many light-gray branches. It is particularly beautiful in spring and early summer when in blossom.

HABITAT.— California, from Los Angeles Co. to Mt. Shasta, growing along the borders of streams and slopes of the Coast Ranges and the western foot-hills of the Sierra Nevada Mountains. It reaches its greatest development north of San Francisco Bay.

PHYSICAL PROPERTIES.—Wood light, soft, brittle, very closely-grained, compact, with numerous fine medullary rays and susceptible of a very smooth polish. It is of a delicate creamy-white color, with little distinction between the heart and sap-woods. *Specific Gravity,* 0.4980; *Percentage of Ash,* 0.70; *Relative Approximate Fuel Value,* 0.4945; *Coefficient of Elasticity,* 68216; *Modulus of Rupture,* 635; *Resistance to Longitudinal Pressure,* 355; *Resistance to Indentation,* 108; *Weight of a Cubic Foot in Pounds,* 31.04.

Uses.— Little use is made of this wood, though its properties would suggest its appropriateness for use in turnery, etc. The beauty of the tree too should give it greater popularity than it now has for ornamental purposes.

Medicinal Properties are not claimed of this species.

Order LEGUMINOSÆ: Pulse Family.

Leaves alternate, usually compound, entire and furnished with stipules. *Flowers* with 5 sepals more or less united at the base; petals 5, papilionaceous or regular; stamens diadelphous, monodelphous or distinct and with versatile anthers; pistils single, simple and free. *Fruit* a legume (pod) with mostly albumenless seeds.

Genus CERCIDIUM, Tulasne.

Leaves alternate, abruptly bipinnate, with one or two pairs of 4-8-foliate pinnae, and common petiole short; very early deciduous, stipules minute or wanting, leaflets ovate to obovate without stipels. *Flowers* perfect, yellowish or whitish, on slender pedicels, in short, loose few-flowered axillary racemes; calyx 5-parted, produced at base and jointed upon the pedicel, membranous, persistent, with acute deciduous lobes, valvate in aestivation; petals 5, orbicular or oblong, clawed, yellow, imbricated in aestivation, the upper one broader, longer-clawed and within the others, somewhat cordate, pubescent and glandular at base; stamems 10, free, with filaments hairy at base, inserted with the petals on the margin of the disk, exserted, the upper one gibbous on the upper side; anthers versatile, 2-celled and longitudinally dehiscent; pistil with filiform style turned inward in the bud, minute stigma; ovary short-stipetate and containing several anatropous suspended ovules. *Fruit* a linear-oblong legume, compressed, with thick margins, more or less contracted between the seeds or sometimes not, obliquely veined, tardily dehiscent by two valves; seeds ovate-oblong with long slender funicluli and thin crustaceous testa; embryo compressed and with thin hard albumen.

A genus of few species of the warmer parts of the New World and name taken from the Greek *κερκίδιον*, an instrument used in weaving and applied on account of a fancied resemblance in the pods.

128. CERCIDIUM TORREYANUM, Sarg.*

Green-barked Acacia, Palo Verde.

Ger., *Grünrinde Acacie;* Fr., *Acacia à écorce vert;* Sp., *Palo Verde.*

Specific Characters. — *Leaves* few and scattered, about 1 in. in length, sparingly pubescent, with slender petioles and 2 pinnae, each with 2–3 pairs of oblong, obtuse, somewhat oblique, glaucous leaflets ¼ in. or less in length. The leaves fall very early, soon after expanding; branchlets sparingly pubescent when young but quite glabrous later, glaucous, furnished with stout prickles about ¼ in. in length. *Flowers* begin to appear in April with the leaves, and continue for three or four months so that flowers and pods in various stages of development are found on the tree at the same time, about ⅝ in. across when expanded, with long pedicels in 4–5-flowered racemes, with small acute caducous bracts; gland on the upper petal very prominent; ovary glabrous. *Fruit* ripe in July, legumes 3–4 in. long, slightly turgid, with 2–8 seeds and often contracted between the seeds; nerve of ventral suture grooved.

(The specific name, *Torreyanum*, is given in compliment to Dr. John Torrey, the botanist.)

* *Parkinsonia Torreyana.* Watson in *Botany of California*, etc.

A small tree, occasionally attaining the height of 30 ft. (10 m.), and 16 or 18 in. (0.50 m.) in diameter of trunk, with irregular top of many fine tough branchlets, these and even the large branches covered with a thin, smooth, yellowish green (pea green) bark. The bark of trunk finally becomes fissured longitudinally and the smooth green epidermis persists for a time on the summits of the ridges thus formed. Finally that scales off and leaves a light brownish-gray bark, rough with irregular longitudinal thick-scaly ridges.

It is a tree of handsome, curious aspect, owing to the generally prevailing light green color throughout its top, its numerous fine branches and very limited foliage, and even that only seen for but a few weeks of the year. It affords a delightful relief against the everywhere prevailing sand-color of the dreary parched desert in which it grows.

HABITAT.— The "washes" and depressions among the sand-hills of the Colorado Desert in southern California, and the region of the Gila River in Arizona.

PHYSICAL PROPERTIES.—Wood heavy, moderately strong and soft, compact, occasionally figured and susceptible of a smooth satiny polish. The heart-wood is small and of a strong and very disagreeable odor when fresh; the abundant sap-wood is of a rich clear light-yellow color and of rather pleasant odor. *Specific Gravity*, 0.6531; *Percentage of Ash*, 1.12; *Relative Approximate Fuel Value*, 0.6458; *Coefficient of Elasticity*, 55839; *Modulus of Rupture*, 546; *Resistance to Longitudinal Pressure*, 417; *Resistance to Indentation*, 226; *Weight of a Cubic Foot in Pounds*, 40.70.

GENUS PROSOPIS, LINNÆUS.

Leaves bipinnate with one or two (sometimes more) pairs of pinnæ, each with several small, entire, rather rigid leaflets; stipules none and petioles, etc., usually furnished with minute glands. *Flowers* regular, small, greenish, and usually sessile in cyllindrical or globose, axillary, pedunculate spikes or heads; calyx campanulate, with 5 very short teeth valvate in æstivation; petals 5, connate at first below, at length free, distinct, tomentose within (in our species), hypogynous, valvate in æstivation; stamens 10, free, exserted, those opposite the calyx-lobes rather the longer, with oblong, versatile, introse, 2-celled anthers, dehiscent by lateral longitudinal slits, and connective usually tipped with a minute deciduous gland; pistil with filiform style, minute stigma and villose (in the American species) ovary containing many anatropous, suspended ovules in 2 ranks, from the inner angle of the ovary. *Fruit* a linear coriaceous legume, compressed or nearly terete, straight, falcate or twisted into a spiral, indehiscent, with usually thick spongy mesocarp and partitions between the numerous compressed ovate-oblong seeds, which have a crustaceous testa and contain horny albumen, an embryo with short straight radicle and flat cotyledons.

Genus represented in the United States by small trees and shrubs in the arid regions of the Southwest. (The name *Prosopis* is the ancient Greek name of the Burdock and is of obscure application here.)

129. PROSOPIS JULIFLORA, DC.

Mesquit, Mesquite, Honey Pod.

Ger., *Honighülse;* Fr., *Cosse de miel;* Sp., *Algaroba.*

Specific Characters : —*Leaves* alternate or fascicled, glabrous or pubescent, deciduous, with terete petiole 2–4 in. in length and with 2 (rarely 4) pinnae 3–6 in. long each with 6–15 pairs of short, oblong-linear, acute or obtuse entire leaflets sessile or nearly so, $\frac{3}{4}$–$\frac{1}{2}$ in. in length, rigid and variously located upon the rachis, which terminates in a slender point; stipules deciduous; branchlets with stout axillary spines or unarmed. *Flowers* commencing in May and continuing for 2 months, small, greenish-white, fragrant, nearly sessile, in the axils of minute deciduous bracts, in slender spikes 1–4 in. in length and usually densely flowered, with peduncles scarcely 1 in. in length; petals oblong-linear covered within with white hairs which project as a tuft at the apex of the bud; stamens twice as long as the petals and with large conspicuous yellow anthers; pistil with ovary clothed with silky hairs and with short stipe. *Fruit* a straight or curved legume, 4–5 in. or more long and $\frac{1}{4}$–$\frac{1}{2}$ in. wide, flat at first but subterete at maturity and compressed between the seeds, pointed at both ends, pale-yellow or mottled with reddish, longitudinally veined and with thick sweet pulp, containing 10–20 seeds each in a closed nut-like membranous covering (endocarp); seeds obliquely located in the pods, oblong, flattened and with shining light-brown testa.

(The specific name, *juliflora*, is from the Latin *julius* or *iulius*, *down* or *moss*, and *flos*, flower, refering to the hairy nature of the flower.)

A small tree, and often but a mere shrub, but sometimes attaining the height of 40 or 50 ft. (15 m.), with a short trunk 2 ft. (0.75 m.) in diameter. It has usually a loose, straggling, wide top of crooked branches, and the trunk is invested with a brownish-gray bark, checking longitudinally into loose, shreddy, fibrous ridges.

Habitat.— Southern California and eastward to about central Texas, northward to about the line of southern boundary of Utah and Colorado and far southward, even into the south temperate zone, growing on dry prairies and rocky plains. Its greatest development within the United States is found along the desert streams of southern Arizona, where it forms forests of considerable size.

Physical Properties.— The wood of the Mesquit is quite heavy, hard, not strong, compact, with numerous medullary rays and many quite evenly distributed open ducts, very durable in contact with the soil; of a light chocolate-brown color often streaked with darker, and with thin, light-yellow sap-wood. *Specific Gravity*, 0.7652; *Percentage of Ash*, 2.18; *Relative Approximate Fuel Value*, 0.7485; *Coefficient of Elasticity*, 58297; *Modulus of Rupture*, 485; *Resistance to Longitudinal Pressure*, 588; *Resistance to Indentation*, 343; *Weight of a Cubic Foot in Pounds*, 47.69.

Uses.— This is a tree of great utility in regions where abundant. The wood is used for the underpinnings of buildings, railway ties, fence posts, paving blocks, etc., for which its great durability in contact with the soil renders it very valuable. It is occasionally used for furniture, etc., and

is excellent for fuel. It produces a valuable charcoal. The pods of the Mesquit constitute a valuable article of food with the Indians and Mexicans, who grind or pound them into a flour and bake in cakes or loaves. They also make a healthful beverage — Mesquite Atole — from the fresh pods, and from the flour a weak beer. The pods are also eaten with avidity by cattle, horses, etc.

MEDICINAL PROPERTIES. — Mesquite gum, which exudes from the stem and branches in the form of amber-colored tears, is quite similar to the gum Arabic in properties.*

NOTE. — The roots of the Mesquite, particularly the tap-root, penetrates to a great depth, it is said even 40 or 50 ft. or more beneath the surface of the soil, to a stratum of subsoil where moisture may be found, and there spreads out in all directions. So constant is this that the size and thriftiness of the tree, it is said, has been found to indicate the distance down to the water, and the larger the tree the nearer the water is indicated to be to the surface of the soil.

The development of these roots is sometimes enormously out of proportion to the size of the plant above ground, and they give the plant a foothold and support which only can account for its maintenance of life, on some of the drifting sand dunes and desert plains on which they are found. Providentially these roots are of great utility in those localities, where nothing else can be procured for fuel, as they are dug or hauled out with teams for that use.

ORDER ROSACEÆ: ROSE FAMILY.

Leaves alternate and with stipules which sometimes fall early or are rarely wanting. *Flowers* regular; sepals 5 or rarely fewer, united at the base and often furnished outside with bractlets resembling the sepals; petals as many as the sepals, or, rarely, wanting, distinct and inserted on a disk which lines the calyx-tube; stamens distinct, numerous (with rare exceptions, and inserted with the petals on the disk of the calyx-tube; pistils 1–many distinct or united and often combined with the calyx-tube. *Fruit* various, as drupe, pome, achenium, etc.; seeds solitary or few, mostly albumenless, with straight embryo and large thick cotyledons.

Trees, shrubs and herbs, many of great economic value in the production of most useful fruits, beautiful flowers, choice perfumes, etc.

GENUS CERCOCARPUS, HBK.

Leaves alternate, simple, evergreen, coriaceous, entire or serrate, straight-veined, short-petiolate; stipules very small and deciduous. *Flowers* perfect, small, axillary or terminal, solitary or fascicled, sessile or nearly so; calyx with narrow, cylindrical tube, and cup-shaped, 5-lobed, deciduous limb, lobes slightly imbricated; petals none; stamens 15–30, inserted in two or three rows on the limb of the calyx, filaments short, free, incurved in the bud; anthers oblong, usually pubescent, introse, with cells distinct and opening longitudinally; pistil solitary, with single carpel, with filiform style, minute terminal stigma and ovary included in the calyx-tube, terete, acute, silky and containing a solitary anatropous ascending ovule attached near the base. *Fruit* a coriaceous, linear-oblong, villose, achenium, included in the

* *U. S. Dispensatory*, 16th ed., p. 1857.

persistent and enlarged calyx-tube and tipped with the elongated, persistent, plumose style; seed solitary, linear-acute, erect, without albumen and with membranous testa.

Genus represented by few species of shrubs and small trees of the interior mountainous region of North America. (The name is from the Greek κερκος, *a mouse's tail*, and καρπός, *fruit*, alluding to the singular tail-like fruit.)

130. CERCOCARPUS PARVIFOLIUS, Nutt.

Mountain Mahogany.

Ger. *Gebirgs-Mahogany;* Fr., *Buisson à plumes;* Sp., *Caoba de Montaña.*

Specific Characters. —*Leaves* obovate, ½–1½ in. long, coarsely glandular serrate towards the rounded or obtuse apex, cuneate and with entire, revolute margin at base, somewhat coriaceous, pale-pubescent when young, with minute silky appressed hairs or quite glabrous and yellowish-green above at maturity, and paler, whitish or ferruginous and minutely puberulent beneath, with prominent midrib and veins; petiole short, broad and pubescent; stipules early deciduous; juice of leaves of aromatic and birch-like flavor. *Flowers* pale-tomentose with short slender pedicels and borne singly or 2–4 together in the axils of the crowded leaves; calyx-lobes short, and the tube, at first 2–4 lines long, becomes in fruit 6–8 lines long, deeply cleft at the apex and of a purple-brown color. *Fruit* an achenium, sulcate on the back and terminating with persistent, tail-like style, 2–4 in long and all covered with silky yellowish-white hairs.

Quite variable in the size, form and pubescence of leaf; as in var. *glaber*, in the vicinity of Santa Barbara, large with broader and glabrous leaves, and in par. *paucidentatus*, of southern Arizona and northern Mexico, with entire or sparingly toothed leaves, and in *brevifolius*, along the southern border, with very small leaves.

(The specific name, *parvifolius*, is the Latin for *small-leaved.*)

Commonly a tall shrub branching from near the ground, but occasionally a small tree with rigid upright branches, and rarely attains the height of 30 feet (9 m.) with a trunk 8 or 10 in. (0.30 m.) in diameter, with thin reddish-brown bark rough with long irregular scales.

Habitat.—Among the mountains of Wyoming, Colorado, New Mexico and westward; not found, however, in Nevada, but occurring in southern Oregon, and thence southward along the western slope of the Sierra Nevada Mountains, and among the Coast Ranges into Lower California and in Mexico. It is found on gravely slopes and ridges, and in desert regions on the "washes" leading from the mountains.

Physical Properties.—Wood very heavy, hard, close-grained, compact, with numerous fine medullary rays, and uniformly distributed fine ducts, difficult to work, but susceptible of a beautiful polish. It is of a rich, reddish-brown color, with thin whitish sap-wood, the transition from sap-wood to heart-wood being in a uniform gradation, the color of the former gradually darkening to that of the latter. *Specific Gravity*, 0.9365; *Percentage of Ash*, 0.45; *Relative Approximate Fuel Value*, 0.9323; *Weight of a Cubic Foot in Pounds*, 58.36.

Uses.—An excellent wood for fuel and occasionally used in turnery, as for tool-handles, etc., and the leaves serve as food for cattle to some extent in late summer and autumn.

Medicinal Properties have not been detected in this species.

ORDER **CORNACEÆ**: DOGWOOD FAMILY.

Leaves opposite (except in one species), simple, mostly entire. *Flowers* in cymes, often involucrate, polypetalous (exceptionally apetalous), 4-numerous; calyx-tube adherent to the ovary, its limbs minute; petals valvate in the bud, oblong, sessile, and, with the stamens, borne on an epigynous disk in the perfect flowers; ovary 1-celled, bearing a single suspended ovule; style single, somewhat club-shaped. *Fruit* a 1-2-seeded baccate drupe, bearing the persistent limb of the calyx.

Trees, shrubs or rarely herbs, with bitter, tonic bark.

GENUS GARRYA, DOUGLAS.

Leaves entire, or nearly so, coriaceous, evergreen, and with short petioles connate at base; branchlets more or less 4-angled. *Flowers* dœcious, in axillary aments, solitary or three together between decussately connate bracts, apetalous; the staminate with calyx 4-parted, the segments linear and valvate; stamens 4, distinct; disk and ovary wanting; *pistillate flowers* with calyx-limb of 2 short lobes or obsolete; disk and stamens none; pistil with 2 persistent styles, stigmatic on the inner side and 1-celled ovary, containing 2 pendent ovules suspended by funiculi from top of cell. *Fruit* an ovoid or subglobose blue or purple berry, containing 1-2 oblong compressed seeds with copious fleshy albumen and minute embryo with oblong cotyledons.

131. GARRYA ELLIPTICA, DOUGLAS.

SILK-TASSEL TREE, QUININE TREE.

Ger., *Seidenquastenbaum;* Fr., *Arbre à signets de soie;* Sp., *Arbol de borlita de seda.*

SPECIFIC CHARACTERS.—*Leaves* elliptical, 1½-4 in. long, rounded or acute and mucromate at apex, truncate or rounded at base, thick, concave beneath, margins revolute and undulate, smooth, dark green and shining above, densely pale-tomentose beneath as with the petioles and new growths at first. *Flowers* in solitary or clustered pendulous aments; the staminate 2-5 in. long, tassel-like with truncate or acute bracts silky as with the calyx-lobes; pistillate aments shorter and stouter, 1-4½ in. long, with acute or acuminate bracts; ovary densely silky-tomentose, sessile. *Fruit* subglobose, about ¼ in. in diameter, tipped with the remnant of the styles, conformed to each other by mutual pressure in the compact raceme, densely pale silky tomentose, with purple juicy flesh, this finally in drying separating from the epicarp, which retains its original form, and dries down about the one or two compressed seeds.

(The specific name, *elliptica*, is a Latin word and descriptive of the elliptical form of the leaves.)

The Silk-tassel Tree is more often a crookedly branched shrub than a tree, but it does occasionally attain the stature of a tree. The largest we have seen was 12 in. (0.30 m.) in diameter of trunk which branched about five feet from the ground into a wide-spreading, irregular top not more than 20 ft. (6 m.) in height. The bark of trunk is of a brownish-gray color and rough with thin irregular friable scales. It is a peculiarly handsome and striking tree in January and February, with its long catkins hanging in clusters like tassels of thick "chinchilla" worsted.

HABITAT.— From the vicinity of Monterey northward to the Columbia River, growing on hill-sides and the slopes of streams near the coast.

Physical Properties.— Wood rather soft, brittle, not strong, shrinking greatly in drying, fine-grained, and with many conspicuous medullary rays; of a purple-brown color, and with abundant whitish sap-wood, which soon, after being cut, assume a darker cast, especially if cut in warm weather.

Uses.— Little if any use is made of this tree, although its unique beauty, especially when in blossom, would certainly commend it for ornamental purposes.

Medicinal Properties, so far as known, have never been found in this species.

Order ERICACEÆ: Heath Family.

Leaves commonly alternate, but sometimes opposite and rarely whorled, without stipules. *Flowers* regular, symmetrical, perfect and 4-5-numerous; corolla present and lobed or of distinct petals; stamens as many as the lobes of the corolla, or twice as many, free from it, but inserted with it on an annular disk; anthers usually introrse, commonly appendaged and opening by terminal chinks or pores, pollen compound, of 4 united grains (except in a few herbaceous species, the *Monotropæ*); pistil with single style, superior or inferior ovary, having as many cells as the lobes of the corolla, or rarely fewer. *Fruit* a berry, drupe or capsule with small anatropous seeds having small embryo in fleshy albumen.

A large family, mainly of shrubs, but a few trees and herbs, and quite various in characters.

Genus ARBUTUS, Tournefort.

Leaves alternate, coriaceous, petiolate, entire or toothed (sometimes in the same plant), obscurely pinnately veined, without stipules and persistent. *Flowers* small, white or pinkish, in terminal panicles, with pedicels developed each from the axils of usually two ovate membranous and persistent bracts; calyx small, free from the ovary, 5-parted nearly to the base, the lobes acute, membranous and persistent, corolla gamopetalous, hypogynous, subglobose or urn-shaped, white, pinkish or greenish and with 5, recurved, obtuse teeth, imbricated in æstivation, stamens 10, included, inserted on the bottom of the corolla, filaments dilated and hairy at base and anthers 2-celled, short, laterally compressed, introrse, furnished near the summit behind with two reflexed awns, cells opening each by a pore near the top anteriorly; pistil with single columnar exserted style with terminal obsurely 5-lobed stigma and 5-celled ovary sessile upon the hypogynous glandular disk, the cells containing numerous anatrapous ovules attached to central placentæ. *Fruit* a globose berry with smooth or granular surface, 5-celled, and with several small compressed pointed seeds in each cell, with axil embryo in copious hard albumen.

A genus of few species of interesting trees and shrubs of the warmer temperate regions of both hemispheres. (*Arbutus* is the ancient Latin name of the European species.)

132. ARBUTUS MENZIESII, Pursh.

Madroña, Madroña Laurel, Strawberry Tree.

Ger., *Erdbeerbaum von Menzies;* Fr., *Arbousier Menzies;* Sp., *Madroña.*

Specific Characters:—*Leaves* oval or oblong, 3–5 in. long, rounded at apex or abruptly pointed, mostly rounded at base, with entire (on young shoots often serrate) and slightly revolute margins, thick, coriaceous, with strong midrib and at maturity lustrous dark green above, pale beneath and with conspicuously reticulate veinlets; petiole ½–1 in. in length, stout and with margins of blade often decurrent upon it. *Flowers* about ¼ in. in length and borne in rather close, pubescent, compound terminal

racemes forming a cluster 5–6 in. in length and width, with slender pedicels in the axils of scarious, ciliate bracts; calyx-lobes white and membranous; corolla subglobose, white; ovary glabrous. *Fruit* an orange-colored subglobose glandular-roughened dryish drupaceous berry, about ½ in. long and with thin hardly edible flesh, and 5 cells, the walls of which are more or less perfectly developed into a cartilaginous stone and each cell containing several dark brown angular pilose seeds, tightly pressed together.

(The specific name, *Menziesii*, commemorates the name of the discoverer, Archibald Menzies, a Scottish naturalist who discovered the tree about a century ago.)

One of the most beautiful and interesting trees of the American forests, and of which the Californians are justly proud. When growing in the forests it attains, sometimes the height of 100 ft. (33 m.) with a tall straight trunk 3 or 4 ft. (1 m.) in diameter, but when growing by itself it develops a wide rounded top with large horizontal branches and stout trunk sometimes 5–7 ft. (2 m.) in diameter, with wide burly base considerably increasing the thickness at the surface of the ground. Such a tree growing at the base of Mt. Tamalpias, near San Rafael, is perhaps the most wonderful of its kind in existence. It measures 23 ft. in girth 3 feet from the ground and its branches cover an area nearly 100 ft. across. The beauty in the Madroña is the clear wine color, very smooth bark of branches and small trunks, in combination with the broad, rich, evergreen leaves, and perhaps interspersed with the large panicles of white flowers or the reddish-orange fruit. The outer layer of this bark exfoliates annually in large thin scales. The bark of trunk is of a brownish-gray color, checked longitudinally and crosswise into thin irregularly oblong and square scales.

HABITAT.—From the islands along the coast of British Columbia southward among the mountains to southern California, growing on slopes and in rich well-drained soil, within the influence of the fogs which set in from the Pacific. It attains its greatest size among the mountains north of San Francisco and southward becomes reduced to a mere shrub.

PHYSICAL PROPERTIES.—Wood heavy, hard, strong, with many fine medullary rays, close grained and checking badly in drying. It is of a light red color with thin pinkish-white sap-wood. *Specific Gravity*, 0.7052; *Percentage of Ash*, 0.40; *Relative Approximate Fuel Value*, 0.7024; *Coefficient of Elasticity*, 83834; *Modulus of Rupture*, 907; *Resistance to Longitudinal Pressure*, 502; *Resistance to Indentation*, 207; *Weight of a Cubic Foot in Pounds*, 43.95.

USES.—The wood is used to some extent in the manufacture of furniture, etc., and to considerable extent for charcoal for gun powder. Its bark is also used sometimes for tanning purposes.

As a tree for ornamental purposes it well deserves extensive popularity, as it is of rare good qualities.

MEDICINAL PROPERTIES have not been discovered in this species.

Genus ARCTOSTAPHYLOS, Adanson.

Leaves alternate, thick, coriaceous, persistent (in all but one Arctic-alpine species), entire or irregularly toothed. *Flowers* white or rose-colored, from the axils of persistent bracts, in terminal and often clustered racemes; calyx small, free from the ovary, 4–5-parted nearly to the base, with membranous persistent lobes; corolla gamopetalous, hypogynous, subglobose to urn-shaped, and with 4–5 short, obtuse, recurved lobes; stamens 10 (occasionally 8), included, inserted on the base of the corolla; the anthers 2-celled, furnished near the apex with 2 reflexed awns and the cells opening each by a terminal pore; pistil same as in the genus *Arbutus*, but with single suspended ovule in each cell. *Fruit* drupaceous or berry-like with thin, dry and somewhat austere flesh, and 5–10 seed-like, compressed bony nutlets, or sometimes more or less united into a 5–10-celled, or by obliteration even singled-celled, nutlet, each cell containing a single suspended seed.

Genus represented by shrubs or small trees of several interesting but no sharply defined species, mostly Californian. (The name is from the Greek ἄρκτος, *a bear*, and σταφυλή, *berry*.)

133. ARCTOSTAPHYLOS PUNGENS, HBK.*

Common Manzanita.

Ger., *Californianische Bärentraube;* Fr., *Busserole de Californie;* Sp., *Manzanita comun.*

Specific Characters. — *Leaves* oblong-lanceolate to oval, mostly obtuse or acute and mucronate at apex, and mostly rounded or obtuse at base, 1–2 in. in length, more or less vertical upon the branchlet by a twist in the stout petiole, very rigid, pale and usually glaucous-green, entire or sometimes on young vigorous shoots dentate; branchlets, petioles and peduncles minutely cinereous-tomentose when young, or glabrous (not hispid-hairy). *Flowers* in short crowded racemes, white or pinkish, with short glabrous pedicels; stamens with filaments strongly ciliate-bearded; ovary glabrous. *Fruits* smooth, flattened-globose, about ¼ in. or less in diameter, yellowish at first but turning to a dull red, with thin mealy flesh and separate outlets, or only one or two pairs cohering, ⅛ in. or less in length.

(The specific name, *pungens*, is the Latin for *pointed*, and of rather obscure application, perhaps referring to the pointed nature of the leaves.)

The Manzanita is usually a shrub of but a few feet in height with many crooked stems and tortuous branches, but occasionally it attains the dimension of a low wide-spreading tree. The largest we have seen was 18 ft. (4.50 m.) in height, with a very short trunk 7 ft. (2.10 m.) in girth at the smallest place, and sending out immediately low wide-reaching branches, making a spread of 48 ft. (14.50 m.), the branches taking root where they touched the ground. The bark of the Manzanita is very smooth, close and of a rich brownish-red or mahogany color, and as the outer layer annually exfoliates in thin, papery curved scales, what is left is almost as thin as paper.

Habitat. — The Pacific Coast region from Oregon southward into Mexico, and eastward to Utah and New Mexico, growing on dry ridges and mountain slopes of great range of altitude.

* *Arctostaphylos Manzanita*, Parry.

PHYSICAL PROPERTIES. — Wood heavy, hard, easily splitting, with very fine medullary rays and close grain. It is of a rich brownish red color with thin whitish sap-wood, the transition of color from the sap-wood to that of the heart being of uniform gradation. It is when fresh a very handsome wood.

USES. — The wood of the Manzanita is employed to some extent for small articles of turnery and fancy work, as for cuff buttons, fancy boxes, etc. The fruit is said to be eaten by Indians sometimes and it is also an important article of food with bears and certain birds.

MEDICINAL PROPERTIES are not known of this species.

ORDER **BIGNONIACEÆ**: BIGNONIA FAMILY.

Leaves simple or compound, opposite (rarely alternate), exstipulate. *Flowers* perfect, rather large and showy; calyx 2-lipped, or 5-cleft or entire; corolla monopetalous, tubular or bell-shaped, irregular, 5-lobed or 2-lipped, the lowest lobe the largest; stamens 5, but only 2 or 2 pairs being fertile (the others existing as rudiments) inserted on the corolla, anthers with 2 diverging cells; pistil solitary with superior 2-celled (rarely 1-celled) ovary, long style, 2-lipped stigma and numerous anatropous ovules. *Fruit* a dry coriaceous 2-valved deliscent capsular pod with numerous large flat and usually winged seeds.

Woody plants chiefly of the tropics.

GENUS CHILOPSIS, DON.

Leaves opposite, alternate or scattered, linear or linear-lanceolate, 3-6 in. or more in length and $\frac{1}{2}$-$\frac{1}{4}$ in. in width, long pointed, entire, without stipules, light green, smooth or glutinous, involute in vernation, sessile or nearly so from an enlarged base, midrib prominent both sides and with few conspicuous, prolonged lateral veins. *Flowers* in short puberulous crowded racemes 3–4 in. long terminating leafy branchlets of the season, with slender pedicels, from the axils of acuminate, membraneous deciduous bracts and themselves furnished with two similar bractlets above the middle; calyx membraneous, pale-tomentose outside, cleft to the base into two ovate concave lobes minutely toothed at apex and closed before blossoming in an apiculate bud, corolla funnel-shaped, about $1\frac{1}{2}$ in. in length and slightly less in width, white shaded into pale purple, yellow-blotched in the dilated throat, slightly oblique, with an ample bilabiate spreading limb, having rounded lobes and with erose undulate margin, the upper lip of two lobes and the under of three, the central one longest; stamens 4, besides the rudiments of a fifth posteriorly located, inserted on the corolla near its base, didynamous, with filiform, glabrous filaments and introrse anthers having two naked diverging cells opening by longitudinal slits, pistil sessile on the anular disk, with slender style 2-lobed at the apex, and 2-celled, conical glabrous ovary, each cell containing numerous amphitropous ovules horizontally inserted on a central placenta. *Fruit* a slender, thin-walled terete capsule, 6-10 in. long, thickest in the middle (about $\frac{1}{4}$ in.) and gradually tapering both ways, dehiscent at maturity by two coriaceous valves contrary to the thin loose partition and liberating the numerous light brown exalbuminous seeds about $\frac{1}{2}$ in. long, winged at both ends with a long fringe of soft white hairs, the embryo filling the cavity with broad rounded cotyledons and short radicle.

Genus represented by the following single species and name from the Greek χειλος and ὄψις of obscure application.

134. CHILOPSIS SALIGNA, D., Don.*

Desert Willow, Flowering Willow.

Ger., *Wüste-Weide;* Fr., *Saule du desert;* Sp., *Sauce del desirto.*

Specific Characters incorporated in the above generic description, this being the only species.
(The specific name, *saligna*, is a Latin adjective from *salix*, *the willow.*)

A small tree and commonly rather a shrub than tree, but under most favorable influences it attains the height of 25 or 30 ft. (8 m.), with short and often inclined trunk 12 in. (0.30 m.) in diameter, vested in a grayish-brown bark, with broad, interbranching, firmly adherent, fibrous ridges. Its habit of growth, with long slender and more or less drooping branchlets, is quite similar to the willows proper. It is a cheerful relief in the desert, with its bright green grass-like leaves and handsome flowers, which commence in early summer and continue for several months. When leafless it is conspicuous on account of its long, slender pods which swing among the branches long after the leaves have fallen.

Habitat.—San Bernardino Co. and southward in California, eastward into Texas, northward as far as Nevada and Utah, and southward into Mexico, where it is said to attain its greatest development. It grows along the courses of streams and in the "washes" and depressions of the deserts in dry gravely soil.

Physical Properties.—Wood light, soft, not strong, checking badly in drying, with many fine medullary rays and annual rings indicated by large open ducts which are also quite uniformly distributed through the rest of the ring. It is of a dark and slightly greenish-brown color with thin lighter sap-wood. *Specific Gravity*, 0.5902; *Percentage of Ash*, 0.37; *Relative Approximate Fuel Value*, 0.5880; *Coefficient of Elasticity*, 54421; *Modulus of Rupture*, 578; *Resistance to Longitudinal Pressure*, 297; *Resistance to Indentation*, 144; *Weight of a Cubic Foot in Pounds*, 36.78.

Uses.—Little or no use is made of this wood, though the trees are occasionally planted for ornamental purposes in the southwest and in Mexico, for which it is admirably suited, blooming as it does all summer long in spite of the dryness, with delightfully fragrant flowers, and can be easily propagated by cuttings as well as by seeds.

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* *Chilopsis linearis*, DC.

ORDER **PLATANACEÆ**: PLANE-TREE FAMILY.

Leaves simple, alternate, palmately-veined and lobed, with sheathing scarious stipules. *Flowers* monœcious, destitute of both calyx and corolla, in separate and globular heads. *Sterile flowers* numerous; stamens intermixed with small, club-shaped scales; filaments very short; anthers 2-celled, linear. *Fertile flowers:* pistils intermixed with little scales; ovaries inversely pyramidal; style simple, awl-shaped, stigmatic on one side. *Fruit* small, club-shaped, coriaceous nutlets, with bristly tawny down at base, arranged in globose heads and containing a single, pendulous, albuminous seed.

Represented by trees.

GENUS PLATANUS, L.

Characters as given for the order, this being the only genus.

(The name *Platanus* is from the Greek, *πλατύς, broad*, probably in reference to the leaves.)

135. PLATANUS RACEMOSA, NUTT.

CALIFORNIA SYCAMORE.

Ger., *Californianische Platane;* Fr., *Platane de Californie;* Sp., *Platano de California.*

SPECIFIC CHARACTERS:—*Leaves* quite variable in shape, broad heart-shaped rounded, truncate or even cuneate at base, with blade decurrent upon the petiole, mostly 5-lobed (sometimes 3-lobed) the sinuses acute or rounded and extending quite to the middle of the leaf, lobes acute or acuminate, entire or denticulate, mucronately toothed or sometimes sinuate-toothed, densely covered at first with a pale or rusty fugacious tomentum, often 1 ft. or more across, petiole 1-2 in. long; stipules sheathing the branchlet, deciduous, membranous, with dilated foliaceous entire or toothed limb, cleft next to the petiole. *Fruit* nutlets scarcely $\frac{1}{4}$ in. in length, tomentose when young but finally nearly glabrous, beak slender, about $\frac{1}{3}$ in. long, margined with tawny hairs, in globose heads about 1 in. in diameter and 2-7 together in a moniliform spike.

The California Sycamore is very much like its eastern congener in habit growth. It sometimes attains the height of 100 ft. (30 m.) with a trunk 4-5 ft. in diameter (1.20 m·) (exceptionally much larger as with one mentioned in the Botany of California as growing in Los Angeles Co., and having a girth of 29 ft. 7 in.) with light-gray bark exfoliating in large irregular scales and plates, and bark of branches sometimes nearly white. When growing by itself the trunk is short, dividing into massive sprawling branches and developing a large irregular top.

HABITAT.—The river valleys of California, particularly of the interior region and conspicuously the Sacramento valley; thence southward into the southern part of the state, growing in rich moist soil along the borders of streams.

PHYSICAL PROPERTIES.— Wood rather light and soft, brittle, compact and very difficult to split, with conspicuous medullary rays and fine grain; of a light reddish-brown color shaded into a buff-white sap-wood. *Specific Gravity*, 0.4880; *Percentage of Ash*, 1.11; *Relative Approximate Fuel Value*, 0.4826; *Coefficient of Elasticity*, 62401; *Modulus of Rupture*,

526; *Resistance to Longitudinal Pressure*, 324; *Resistance to Indentation*, 93; *Weight of a Cubic Foot in Pounds*, 30.41.

USES.— Like the eastern Sycamore the western species seems to have been a long neglected wood, on account of the difficulty of working it and its liability to warp, but cut "quartering," i. e. radially, it possesses rare and beautiful properties, giving it a peculiar value for furniture, interior finishing, etc., which are now becoming appreciated and giving the wood a well-deserved popularity.

MEDICINAL PROPERTIES are not known of this species.

ORDER CUPULIFERÆ: OAK FAMILY.

Leaves alternate, simple, straight-veined; the stipules, forming the bud-scales, deciduous. *Flowers* monœcious, apetalous. *Sterile flowers* in clustered or racemed catkins (or in simple clusters in the Beech); calyx regular or scale-like; stamens 5–20. *Fertile flowers* solitary, clustered or spiked, and furnished with an involucre which forms a cup or covering to the nut; calyx-tube adherent to the ovary, its teeth minute and crowning the summit; ovary 2–7-celled with 1–2 pendulous ovules in each cell, but all of the cells and ovules, except one, disappearing before maturity; stigmas sessile. *Fruit* a 1-celled, 1-seeded nut, solitary or several together and partly or wholly covered by the scaly (in some cases echinate) involucral cup or covering; seed albumenless, with an anatropous, often edible, embyro; cotyledons thick and fleshy.

Represented by both trees and shrubs.

GENUS QUERCUS, L.

Flowers greenish or yellowish. *Sterile flowers* in loose, slender, naked catkins, which spring singly or several together from axillary buds; calyx 2–8-parted or cleft; stamens 3–12; anthers 2-celled. *Fertile flowers* with ovary nearly 3-celled and 6-ovuled, 2 of the cells and 5 of the ovules being abortive; stigma 3-lobed; involucre developing into a hard, scaly cup around the base of the nut or acorn, which is 1-celled, 1-seeded.

(The ancient Latin name for the Oak supposed to be from the Celtic *quer, fine*, and *cuez, tree*.)

136. QUERCUS GARRYANA, DOUGL.

OREGON OAK, MOUNTAIN WHITE OAK.

Ger., *Oregonische Eiche;* Fr., *Chêne de Oregon;* Sp., *Roble de Oregon.*

SPECIFIC CHARACTERS.—*Leaves* deciduous, 4–6 in. long, oval or obovate in outline, coarsely and irregularly pinnately lobed, with narrow sinuses and broad rounded and mostly obtusely pointed and entire or sometimes sparingly undulate-toothed lobes; dull-green above, paler, strongly reticulate-veined and pubescent beneath; petioles ¼–1 in. in length, these with the thick branchlets and large winter-buds tomentose. *Flowers* as described for the genus; calyx-lobes 7–8, linear-lanceolate ciliate; stamens 6–8; pistil with subsessile stigma and abortive ovules at the base of the seed. *Fruit* acorns maturing the first season, sessile or nearly so, 1–1½ in. long oblong-ovoid or obovoid, obtuse and with very shallow small cups, having small lanceolate slightly pubescent closely appressed scales tuberculate at base.

A tree sometimes attaining the height of 100 ft. (30 m.) with open top of strong wide-spreading branches and a trunk 3–4 ft. (1 m.) in diameter,

or exceptionally considerably greater thickness and vested in a light gray bark with rather narrow scaly ridges.

HABITAT.— From Sonoma County, California, northward, principally coastwise, through Oregon, Washington and into British Columbia, growing on the foothills and mountain slopes to a moderate height in dry gravely soil. Common and especially important northward.

PHYSICAL PROPERTIES.— Wood heavy, hard, strong, tough, compact and of a light-brown color with buff-white sap-wood. *Specific Gravity*, 0.7453; *Percentage of Ash*, 0.39; *Relative Approximate Fuel Value*, 0.7424; *Coefficient of Elasticity*, 81109; *Modulus of Rupture*, 879; *Resistance to Longitudinal Pressure*, 505; *Resistance to Indentation*, 240; *Weight of a Cubic Foot in Pounds*, 46.45.

USES.— One of the most valuable of the oaks of the Pacific coast, being there what the White Oak (*Q. alba*) is in the east, to which it is little inferior, and it is applied to quite the same uses, as for furniture, the manufacture of agricultural implements, carriages, furniture, interior finishing and for shipbuilding, cooperage, etc., and largely for fuel.

MEDICINAL PROPERTIES.— Though this species is not mentioned as of medicinal value, astringent and tonic properties found in the other oaks are also found in this.

137. QUERCUS AGRIFOLIA, NÉE.

COAST LIVE OAK, HOLLY-LEAVED OAK.

Ger., *Immergrüne Eiche von der Küste;* Fr., *Chêne vert de la côte*, Sp., *Encina.*

SPECIFIC CHARACTERS.—*Leaves* oval-orbicular to oblong, 2-3 in. long, coriaceous, subpersistent, sinuately spinous-toothed or occasionally a part of the leaves entire, more or less concave beneath, obtuse or rounded (sometimes cordate) at base, rather pale-green and smooth when old, without lustre, with downy petioles usually about ¼ in. long, these as with the new growths and leaves when young pubescent with deciduous stellate hairs. *Flowers* in abundant glabrate aments; calyx with 5-6 ovate lobes; anthers about 6 (sometimes 8 or 10), obtuse or cuspidate; abortive ovules borne at the top of the seed; stigmas on long spreading recurved styles. *Fruit* acorns maturing the first season (hence on the young shoots) sessile or nearly so, solitary or clustered, with elongated tapering nut 1-1½ in. long and about ¼ in. thick, conspicuously lineate when fresh, and with thin turbinated cup, about as broad as deep, and composed of small membranous imbricated, closely appressed, grayish-brown, pubescent scales.

Var. *frutescens*, the Scrub Oak, is shrubby in habit, with smaller leaves (about 1 in. long) and smaller crowded acorns scarcely 1 in. long.

(The specific name *agrifolia* is from the Latin *acer*, *sharp*, and *folium*, *leaf*, alluding to the spinous-toothed leaves.)

This picturesque oak occasionally attains the height of 80 ft. (25 m.), and 6 or 7 ft. (2 m.) in diameter of trunk, and rarely even surpasses those dimensions, but commonly does not nearly attain them. It is a tree

with broad rounded top of many branches, sometimes of very wide expanse and often very much resembling large apple trees in habit of growth. Indeed, as one passes through a region where the tree is common, and growing as it often does sparsely scattered over the country, at some distance apart, the thought constantly recurs to him — what a splendid lot of large apple trees.

The persistence of the leaves, though properly evergreen, is quite variable, some trees losing nearly or quite all of the leaves during the winter, and others retaining them apparently intact. The bark of trunk is thick, reddish and spongy within, of a dark-gray color outside, and fissured into broad, large, firmly adherent, longitudinal ridges, the smooth gray epidermis of the young tree long persisting on the centers of the ridges of the old bark. It is very similar in its appearance to the bark of the Rock Chestnut Oak (*Q. Prinus*) of the Eastern States.

HABITAT.— California, in the vicinity of the coast, from Mendocino County southward to Lower California, especially abundant and well-developed southward and on Santa Cruz Island.

PHYSICAL PROPERTIES.— Wood heavy, hard, compact, rather brittle, the annual layers of growth not all easy distinguishable, with thick conspicuous medullary rays, between and parallel with which are open ducts arranged in rows. The heart-wood is of a reddish-brown color, but only seen in the large and very old trees, and the sap-wood, of which the small trees are generally wholly composed, is of a creamy-white color, when freshly cut, but soon assumes a brownish cast, apparently caused by a fermentation of the sap. *Specific Gravity*, 0.8253; *Percentage of Ash*, 1.28; *Relative Approximate Fuel Value*, 0.8147; *Coefficient of Elasticity*, 95276; *Modulus of Rupture*, 935; *Resistance to Longitudinal Pressure*, 463; *Resistance to Indentation*, 235; *Weight of a Cubic Foot in Pounds*, 51.43.

USES.— Little used except for fuel, for which it is highly prized.

MEDICINAL PROPERTIES are only those common to other oaks, due to an astringency of the bark.

138. QUERCUS DENSIFLORA, H. & A.

TAN-BARK OAK, EVERGREEN CHESTNUT OAK.

Ger., *Eiche mit dichten Blumen;* Fr., *Chêne à fleurs denses;* Sp., *Roble de flores densas.*

SPECIFIC CHARACTERS. — *Leaves* persistent, oblong, 2-5 in. long, obtuse or acute at apex, rounded, obtuse or sometimes acute at base, with revolute and entire or serrate-dentate margin, often strongly concave below, light glaucous-green above, densely yellowish tomentose beneath, as with the short petioles ($\frac{1}{4}$–$\frac{1}{2}$ in. in length) peduncles, branchlets, etc., with stellate and more or less fugacious hairs. *Flowers* in dense erect aments (those of all our other oaks being loose and pendent) 3–6 in. long, stamenate above and pistillate below, or some wholly staminate, clustered on the catkins in glomerules of three subtended by three bracts; calyx with 5 broad woolly lobes; stamens 10, with long slender much exserted filaments and very small anthers;

pollen only about half the size of that of the other oaks; stigmas linear. *Fruit* acorns maturing the second year, solitary or clustered and sessile or with short peduncles; nut oval or oblong, 1–1½ in. long, acute or obtuse and often obscurely triangular at apex, with thick shell tomentose without and within, seated on a very shallow, or even quite flat, cup ¾–1¼ in. broad, silky tomentose inside and outside, with long linear-subulate rigid and spreading or recurved scales.

(The specific name, *densiflora*, is the Latin for *densely flowered*, and descriptive of the peculiar catkins of this species.)

This beautiful and symmetrical oak sometimes attains the height of 80 ft. (24 m.) with a trunk 3–4 ft. (1 m) in diameter invested with a grayish-brown bark which, on small trunks, is of a light-gray color and quite smooth, but finally becomes rough with rather firmly adherent longitudinal ridges. Though it very rarely surpasses the dimensions above given, it generally is much smaller, and sometimes but a shrub from 5–7 ft. in height. A very interesting tree to botanists as it is intermediate in many respects between the other Oaks and the Chestnuts.

HABITAT. — From southwestern Oregon southward along the Coast Ranges to the Santa Lucia Mountains, abundant and reaching its greatest development in the Redwood region.

PHYSICAL PROPERTIES.— Wood heavy, hard, strong, compact, perishable in contact with the soil, of close grain, easily worked and susceptible of a smooth polish, with few large medullary rays and many open ducts arranged in rows between them. It is of a light reddish-brown color with abundant reddish-white sap-wood. *Specific Gravity*, 0.6827; *Percentage of Ash*, 1.49; *Relative Approximate Fuel Value*, 0.6725; *Coefficient of Elasticity*, 96347; *Modulus of Rupture*, 946; *Resistance to Longitudinal Pressure*, 475; *Resistance to Indentation*, 224; *Weight of a Cubic Foot in Pounds*, 42.55.

USES.—The bark of this tree is very rich in tannin, and is considered the most valuable of the Pacific Coast trees for tanning purposes. It is extensively gathered for that use, and we have seen immense numbers of the prostrate trunks deprived of their bark and wastefully left by the bark-peelers to rot on the ground. The wood is extensively used for fuel.

MEDICINAL PROPERTIES.—The abundant tannin found in the bark is available in medicine where an astringent or tonic effect is desirable, especially in the form of a wash or external application.

GENUS CASTANOPSIS, A. DECANDOLLE.

Leaves mostly coriaceous and entire. *Staminate flowers* in slender axillary panicled aments, upon the young shoots, with regularly 5-6-lobed perianth; stamens twice as many as the petals. *Pistillate flowers* 1-3, with scaly sessile involucre at the base of the aments; lobes of perianth 6, in two rows; pistil with usually 3 styles and 3-celled ovary, each cell containing at its lower angle amphithropous ovules. *Fruit* an edible nut maturing the second year, invested 1-2 together, with a subglobose involucre densely covered with stout branched prickles, and finally irregularly dehiscent; seeds solitary and cotyledons plano-convex, thick.

An interesting genus intermediate between *Quercus* and *Castanea*, represented by few species of trees and shrubs mostly of Eastern Asia and adjacent islands. The name is derived from *κάστανον*, *chestnut*, and *ὄψις*, *appearance*.

139. CASTANOPSIS CHRYSOPHYLLA, A. DC.

California Chinquapin, Evergreen Chestnut.

Ger., *Californianische Kastanie;* Fr., *Châtaignier de Californie;* Sp., *Castaña de California.*

Specific Characters:—*Leaves* evergreen, coriaceous, lanceolate to oblong, 1-4 in. long, mostly acuminate at both ends and decurrent upon the short petiole, with entire revolute margin, green, smoothish and with prominent reticulations above, under-surface covered with minute golden yellow lobed scales. *Stanimate aments* 1-3 in. long, densely pubescent. *Pistillate flowers* with three stout glabrous, diverging styles. *Fruit* with involucre densely covered with stout subverticillate many-branched sharp spines, ½ to 1 in. in length and nut usually solitary, about ½ in. long, with triangular and obtusely-pointed apex.

(The specific name, *chrysophylla*, is from the Greek χρυσός, *gold*, and φύλλον, *leaf*, alluding to the color of the under-surface of the leaf.)

The Western Chinquapin is found fruiting abundantly as a mere shrub of but a few feet in height, but under favorable conditions sometimes attains the dimensions of 100 ft. (30 m.) in height, or more, with a trunk 2 or 3 ft. (0.90 m.) in diameter, and rather flat wide top of many branches. The bark of trunk closely resembles that of the chestnut of the east, being of a mottled gray color, and checked into firm longitudinal ridges, on the summits of which persists for a long time the smooth epidermis of the young bark. The handsome evergreen foliage of the tree, with golden under-surfaces, gives it a peculiarly characteristic aspect by which it may be at once recognized. In the latter part of summer it may be seen in flower and with fruit in all stages of development at the same time.

Habitat.—Western Oregon and southward among the Coast Ranges and along the western slope of the Sierra Nevada Mountains to the San Bernardino and San Jacinto Mountains in southern California, reaching its greatest development in northern California.

Physical Properties.—Wood light, soft, not strong, compact, close-grained, with obscure medullary rays and annual rings marked by a single row of large open ducts. It is of a reddish-brown color with numerous lines of dark-brown radiating from the center, which gives the radial section of the heart-wood a peculiar mottled appearance. The abundant sap-wood is brownish-white. *Specific Gravity,* 0.5574; *Percentage of Ash,* 0.35; *Relative Approximate Fuel Value,* 0.5554; *Coefficient of Elasticity,* 101195; *Modulus of Rupture,* 741; *Resistance to Longitudinal Pressure,* 435; *Resistance to Identation,* 119; *Weight of a Cubic Foot in Pounds,* 34.74.

Uses.—Occasionally used in the manufacture of agricultural implements, etc. The bark of the tree, though of little or no value for tanning purposes, is sometimes fraudulently sold as that of the Tan-bark

Oak (Q. *densiflora*) which it quite closely resembles at a certain age. The tree is occasionally planted for ornamental purposes, but not as generally as its merits deserve.

MEDICINAL PROPERTIES are not known of this species.

ORDER **SALICACEÆ**: WILLOW FAMILY.

Leaves alternate, simple, undivided and furnished with stipules, which are either scale-like and deciduous, or leaf-like and persistent. *Flowers* dicœcious, both kinds in catkins, one under each bract or scale of the catkin and destitute of both calyx and corolla, or the former represented by a gland-like cup; ovary 1 to 2-celled; styles wanting, or 2 and short; stigmas often 2-lobed. *Fruit* a 1 or 2-celled, 2-valved pod, with numerous seeds springing from 2 parietal or basal placentæ and furnished with long, silky down; seeds ascending, anatropous, without albumen; cotyledons flat.

Trees or shrubs of rapid growth, light wood and bitter bark.

GENUS SALIX, TOURN.

Leaves generally narrow, long and pointed and usually with conspicuous stipules; bud scales single. *Flowers* appearing before or with the leaves in terminal and lateral cylindrical, imbricated catkins, the scales or bracts of which are entire and each subtending a flower, which is without calyx, and bears at its base 1 or 2 small nectiferous glands. *Sterile flowers* with 2 (but sometimes more) distinct or united stamens. *Fertile flowers:* ovary ovoid lanceolate, taper-pointed; style short; stigmas 2, short and mostly bifid. *Fruit* a 1-celled pod, dehiscent at maturity by two valves which roll back at the summit to liberate the numerous minute comose seeds.

Trees and shrubs with lithe round branches and growing mostly along streams and in moist localities. (*Salix* is from the Celtic *sal*, *near* and *lis*, *water*, alluding to the favorite locality of the willows.)

140. SALIX LAEVIGATA, BEBB.

CALIFORNIA BLACK WILLOW.

Ger., *Californianische Schwarze Weide;* Fr., *Saule noir de Californie;* Sp., *Sauce negro de California.*

SPECIFIC CHARACTERS:*—*Leaves* lanceolate or oblong-lanceolate, acute or acuminate, 3–7 in. long and ¾–1½ in. wide, the earliest obovate with a mucronate point, glabrous, dark-green glossy and prominently nerved above, paler or glaucous beneath, minutely serrulate; petioles downy, not glandular; stipules semicordate, usually small or none. *Flowers* in leafy-peduncled, elongated, flexuose and rather densely flowered aments; scales pallid, villous, dentate; in the male ament roundish-obovate and cucullate; style obsolete or short; stigmas emarginate; scales in the female ament narrower and truncate, with 2–4 irregular teeth at the apex, falling before maturity of the ament; stamens 3–5 with filaments hairy below. *Fruit* capsule conical from a thick base, acute, glabrous; pedicel 3 or 4 times the length of the nectary.

Variety *angustifolia* has leaves narrower, taper-pointed, falcate, 3 or 4 in. long, 9 lines broad near the roundish base; approaching *S. nigra*. It is found near Yerka, Cal. Var. *congesta* has short densely flowered aments scarcely exceeding the ample leaves of the peduncle; capsules globose conical, shortly pedicelled.

(The specific name *laevigata* is the Latin for smooth.)

One of the largest willows of California, it occasionally attains the height of 40 or 50 ft. (15 m.) with a trunk 18 in. (0.45 m.) in diameter, vested in a dark-gray bark, fissured into rough scaly ridges.

* As given by S. M. Babb, Esq., in the Botany of California, for whose elaboration of this difficult genus the botanical world is indebted.

Habitat. — California, from the Sacramento valley southward to the southern border of the State, growing along streams and rich bottom-lands. "Common from 2,000 ft. altitude on the southern slope of the San Bernardino Range to the Coast, and on Santa Catlina Island." *

Physical Properties. — Wood light, soft, moderately tough, close-grained, compact, with light reddish-brown heart-wood and pinkish-white sap-wood. *Specific Gravity*, 0.4872; *Percentage of Ash*, 0.58; *Relative Approximate Fuel Value*, 0.4844; *Coefficient of Elasticity*, 48828; *Modulus of Rupture*, 644; *Resistance to Longitudinal Pressure*, 319; *Resistance to Indentation*, 118; *Weight of a Cubic Foot in Pounds*, 30.36.

Uses. — Little use is made of this wood except in southern California for fuel.

Medicinal Properties of an astringent and tonic nature are common to the genus and mentioned of the *Salix nigra*, Part II, p. 36–37.

GYMNOSPERMÆ.

Flowering, exogenous plants with *leaves* chiefly parallel-veined and cotyledons frequently more than two. *Flowers* diclinous and very incomplete; pistil represented by an open scale or leaf, or altogether wanting, with ovules naked, fertilized by direct contact with the pollen, and seeds at maturity naked — without a true pericarp.

Order CONIFERÆ: Pine Family.

Leaves mostly awl-shaped or needle-shaped, evergreen, entire and parallel-veined. *Flowers* monœcious, or rarely diœcious, in catkins or cones, destitute of both calyx and corolla; stamens one or several (usually united); ovary, style and stigma wanting; ovules one or several at the base of a scale, which serves as a carpel, or on an open disk. *Fruit* a cone, woody and with distinct scales, or somewhat berry-like, and with fleshy coherent scales, seeds orthotopous, embryo in the axis of the albumen.

Trees or shrubs with a resinous juice.

Genus LIBOCEDRUS, Edlicher.

Leaves evergreen, small and scale-like, decussately opposite, closely imbricated, appressed and making a rather flat branchlet. *Flowers* monoecious, in terminal aments, with decussately opposite scales; *staminate* flowers very numerous, small, with 12 or more rounded filament-scales, beneath each of which are 3–4 introrse anthers; pollen grains simple: *pistillate* aments terminating shorter branchlets, with few, 4–6 carpellary scales without bracts. *Fruit* small, cones maturing the first year, not reflexed, of 4–6 thick valvate coriaceous scales, the lowest pair small and sterile, the third pair when present also sterile and connate and the middle pair bearing in its axils each two unequally 2-winged orthotropous erect seeds; cotyledons 2.

A genus of very few species, only one of which is North American and the name is the Greek for *Incense Cedar*.

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* S. B. Parish, "*Trees of Southern California*," p. 347.

141. LIBOCEDRUS DECURRENS, TORR.

CALIFORNIA WHITE CEDAR, POST CEDAR, INCENSE CEDAR.

Ger., *Californianische Weisze Zeder;* Fr., *Thuya blanc de Californie;* Sp., *Thuya blanco de California.*

SPECIFIC CHARACTERS. — *Leaves* in two decussate pairs at each joint, closely adnate excepting the short pointed tip, the lateral glandlesss and overlapping the flattened obscurely pitted inner ones. *Staminate flowers* ovate, with 12–16 scales. *Fruit* oblong cones, $\frac{3}{4}$–1 in. long and scaly-bracted at base, the lowest pair of scales very short, and the second pair oblong, convex, obtuse at tip, fertile and closing against a septum formed by the connate third pair of scales, all tipped with a short recurved mucro; seeds oblong-lanceolate, $\frac{1}{3}$–$\frac{1}{2}$ in. long, with outer wing narrower than the other which nearly equals the scale.

(The specific name, *decurrens*, is a Latin word meaning *running down*, and perhaps refers to the manner in which the leaves continue down upon the branchlet.)

A stately tree of rather pyramidal habit of growth, with lax spreading branches, and sometimes attaining the height of 150 ft. (45 m.) with a columnar trunk 6 or 7 ft. (2 m.) in diameter.

HABITAT.— Oregon and southward along the western slopes of the Cascade and Sierra Nevada Mountains, and among the Coast Ranges to southern California, mostly at from 3,000–8,500 ft. elevation.

PHYSICAL PROPERTIES.— Wood very light, soft, brittle, close-grained, compact, odorous, durable in contact with the soil and with dark-colored bands of summer cells. It is of a reddish-brown color, with lighter and rather thin sap-wood. *Specific Gravity*, 0.4017; *Percentage of Ash*, 0.08; *Relative Approximate Fuel Value*, 0.4014; *Coefficient of Elasticity*, 84729; *Modulus of Rupture*, 682; *Resistance to Longitudinal Pressure*, 403; *Resistance to Indentation*, 98; *Weight of a Cubic Foot in Pounds*, 25.03.

USES.— A very useful timber for fencing, flumes, shingles, etc., and also used for interior finishing.

MEDICINAL PROPERTIES have not been discovered in this species.

GENUS SEQUOIA: ENDLICHER.

Leaves scattered or spirally arranged, decurrent, short-linear to ovate-lanceolate and appressed, carinate, scale-like and long persisting on the branchlet. *Flowers* monœcious, in terminal or axillary globose-oblong aments on the young shoots, and with rather numerous spirally arranged scales. *Staminate aments* very numerous, small, with an involucre of scale-like leaves, with ovate subpeltate connective scales, beneath each of which are 3–5 anther cells; pollen-grains simple. *Pistillate aments* erect with spreading scales and 3–7 inverted ovules at the base of each. *Fruit* an oval woody cone, maturing the second year, with scales diverging at right angles from the axis, thick, wedge-shape and with rhomboidal rugose, umbillicate, setaceously macronate apex; seeds flat, oblong-obovate, with thick, spongy lateral wings; cotyledons 4–6.

A genus of two species of trees, both Californian, of great economic value and gigantic growth. The origin of the name, *Sequoia*, unfortunately not recorded by

Endlicher when he described and named the genus in 1847, has been a matter of considerable controversy. The most commonly approved explanation of the origin is that it is the name of a Cherokee Indian half-breed, Sequoyah, who invented a syllabic alphabet for his tribe.

142. SEQUOIA GIGANTEA, DECSN.

BIG-TREE, GIANT REDWOOD, REDWOOD OF THE MOUNTAINS.

Ger., *Riesenbaum;* Fr., *Arbre gigantesque;* Sp., *Arbol giganteo.*

SPECIFIC CHARACTERS:— *Leaves* small, scale like, 1–3 lines in length, pale green, ovate-acuminate or lanceolate, rigid and pungent, spirally arranged, closely appressed or with points slightly spreading; leaves on very young plants linear, narrower and more spreading; branchlets pendulous. *Staminate aments* only 2–3 lines long. *Fruit*, ovoid-oblong cones, 2–3 in. long and usually of 25–30 scales, which are at apex 1x$\frac{1}{2}$ in. in size, depressed, and with a very delicate prickle in the center, through which runs the longest way of the scale, an elevated ridge; seeds 3–7 with each scale, about $\frac{1}{4}$ in. long, with chocolate-brown center (the seed portion), and golden brown lateral thickish wing-like margins.

(The specific name, *gigantea*, is in Latin descriptive of the *gigantic* stature of the tree.)

These marvelous trees, the pride not only of California but of all America, have in all the world few if any peers in size and majesty. They attain the height of upwards of 350 ft. (150 m.), with a trunk 30 or 35 ft. (10 m.) in diameter, vested in a very thick, reddish-brown, soft, fibrous bark, with great rounded ridges 2 or 3 ft. (0.90 m.) or more sometimes in thickness. The branches of the *Sequoia gigantea* usually leave the trunk at so great a height that the tallest tree of the Atlantic forests could stand beneath them. They are short for the magnitude of the trunk, mostly horizontal or somewhat deflected and dividing into a profusion of drooping branchlets, all forming an open cylindrical narrow head.

HABITAT.—California, the western slope of the Sierra Nevada Mountains from Placer County to the southern border of Tulare County, and from about 4,000 to 8,000 ft. elevation. It does not form extensive tracts of forest, but is interspersed with other trees, as the Sugar Pine, Douglas Spruce, White Fir, Post Cedar, etc., and these trees, as if it were a fashion set by the Giant Sequoia, also attain enormous dimensions, even 10-14 in. in diameter and of great height. To the northward of its range it is found in isolated groups covering small area, but with large trees, in moist swales and depressions among the mountains, while to the southward it is more generally distributed over the mountain slopes,

PHYSICAL PROPERTIES.—Wood very light, soft, weak, brittle, compact and very durable in contact with the soil; of a rich, red color, more intense in some places than in others, and with whitish sap-wood occupying one or two hundred rings. *Specific Gravity*, 0.2882 ; *Percentage of Ash*, 0.50; *Relative Approximate Fuel Value*, 0.2868 ; *Coefficient of Elasticity*, 45146 ; *Modulus of Rupture*, 459; *Resistance to Longitudi-*

nal Pressure, 388; *Resistance to Indentation,* 68; *Weight of a Cubic Foot in Pounds,* 17.96.

USES.—Manufactured to some extent into lumber for general construction purposes, for fencing, boxes, shingles, etc.

MEDICINAL PROPERTIES so far as known have not been detected in this species.

NOTE.—The age of the Big Trees is an interesting matter of speculation, and we believe it is generally very much underestimated. By way of illustration let us consider the age of the tree from which the material for the accompanying sections was taken, as a large chip out of the side of a tree left standing. This tree was 8 ft. in diameter inside the bark. Now by counting the rings of the section we have, and a little figuring, we will see that this tree, only 8 ft. in diameter, was about 1,800 years old, if the rings were of the same thickness throughout as those shown in the section. It is reasonable to suppose that they were about the same, but even allowing that they were not as thin (they may have been even thinner) it is right to presume that this tree must have been at least twelve or fifteen hundred years old. If that be so, what must be the age of the largest trees, 30 ft. and upwards in diameter? Many of the trees now standing must have been quite large trees at the commencement of the Christian era.

Unlike the Redwood of the coast, which reproduces so abundantly by sprouts or suckers, this species sends up but few if any suckers, and reproduces freely from seeds, many little seedling shoots springing up after the trees have been removed.

143. SEQUOIA SEMPERVIRENS, ENDL.

REDWOOD. REDWOOD OF THE COAST.

Ger., *Californianischer Rhotholz*; Fr., *Rouge-bois*; Sp., *Madera roja.*

SPECIFIC CHARACTERS:—*Leaves* of two sorts, the principal ones linear, ½–¾ in. long, mostly acute and pungent, sessile, keeled below and by a twist in the bases forming a flat spray, bright green above, glaucous beneath and the leaves centrally located upon the spray the longest, the others gradually shorter both ways. The other sort of leaves is found on the peduncles, main shoots, and at the bases of the spreading flat sprays; they are shorter, likewise keeled below, scale-like, appressed, with free point and about 2-3 lines in length, differing little from the leaves of the *Sequoia gigantea,* excepting in being less acuminate. The foliage often presents a brownish or bronze-green aspect. *Staminate aments* rather larger than in the *S. gigantea. Fruit* oblong, cones 1 in. or less in length, with about 20 scales, each bearing 3-5 brown seeds, 2-2½ lines in length.

(The specific name, *sempervirens,* is the Latin for *evergreen,* although a character equally true of the other species.)

A magnificent tree, second only to its brother, the Giant Tree, in size, it sometimes attains the height of 300 ft. (92 m.) or more, with a

trunk 21 ft. (7 m.) in diameter, straight, columnar and clothed in a firm cinnamon-colored bark with large prominent ridges often 12 in. (0.30 m.) or more in thickness. It has a narrow open top, composed of short horizontal branches and seeming very small for the size of the trunk.

Habitat.— California, the coast region from the northern part of the state southward to the southern boundary of Monterey County, growing in the cool protected cañons of the Coast Ranges and along the borders of streams and slopes near the ocean. There it often occupies exclusive tracts and with a marvelous density of growth, the large straight columnar trunks ranging from a few feet to fifteen or twenty feet in diameter, and so close together that 50 or 75 may sometimes be counted on a single acre. The tops of about uniform height, quite regardless of the thickness of trunks, almost completely exclude the sunlight from the ground beneath; and the first impression of solitude, gloom and awful grandeur of these wonderful groves as one walks among them for the first time is never forgotten.

Physical Properties.— Wood very light, soft, not strong, brittle, compact, very durable in contact with the soil, susceptible of a smooth polish, easily worked and splitting with such facility that buildings, in regions remote from saw-mills, are sometimes erected with timbers, rafters, siding, and all, split out instead of sawed.

It is of a light-red color, with comparatively thin whitish sap-wood. *Specific Gravity*, 0.4208; *Percentage of Ash*, 0.14; *Relative Approximate Fuel Value*, 0.4202; *Coefficient of Elasticity*, 67646; *Modulus of Rupture*, 597; *Resistance to Longitudinal Pressure*, 416; *Resistance to Indentation*, 77; *Weight of a Cubic Foot in Pounds*, 26.22.

Uses.— Altogether the most important, commercially, of the California woods; it is very largely manufactured into lumber for general construction purposes, for railway ties, fencing, shingles, water-tanks, etc., and the burls, and curly and bird's-eye trunks occasionally found, can scarcely be equaled in ornamental value for interior finishing, furniture, etc.

Medicinal Properties are not known of this species.

Note.— The remarkable tendency of this tree to reproduce by means of sprouts or suckers is equaled by few if any other trees. The young shoots are found coming up in abundance about the bases of stumps, sometimes in a complete circle and vying with each other for supremacy. One of the most remarkable of these circles of trees we have seen is at Mill Valley, near the foot of Mt. Tamalpias, and it there marks the former existence of a Coast Redwood tree, to all appearance even rivaling the Giant Redwood in girth. The base of the tree may be traced nearly the entire circumference by the shell of the stump which now remains and indicates the diameter of 50 ft. at the surface of the ground. Closely

about this shell is a complete circle of "sprouts" ranging from a few inches to three or four feet in diameter. More than likely this gigantic stump, though seemingly of a single tree, was at one time the common base of a group of trees, as two or more are not infrequently found growing so close together that the bases are united and give the appearance of being a single trunk there, though distinct above.

GENUS TAXUS, TOURNEFOT.

Leaves evergreen, flat, more or less rigid, mucronate, mostly scattered, long persisting upon the branchlets and forming flat, two-ranked sprays; buds scaly. *Flowers* diœcious (sometimes monœcious) axillary, from scaly buds, without floral envelopes; the staminate aments small globose or elongated, enveloped at the base with the imbricated bud-scales and consisting of a few (usually 8 or 10) naked stamens; anther-cells 5–9, longitudinally dehiscent and attached to the under side of the peltate, somewhat lobed connective; pollen globose; pistillate flowers on short scaly peduncles and consisting each of a naked, erect ovule, sessile upon an annular disk which becomes if *Fruit* a fleshy red berry-like cup surrounding and nearly enclosing the free small bony seed which contains farinaceous albumen and two cotyledons.

Trees and shrubs mostly of temperate and cool regions, and name supposed to be taken from the Greek τόξον, *a bow*, for which the very elastic wood of these trees is peculiarly suited.

144. TAXUS BREVIFOLIA, NUTT.

PACIFIC YEW, CALIFORNIA OR OREGON YEW.

Ger., *Californianischer Eibenbaum;* Fr., *If de Californie;* Sp., *Tejo de California.*

SPECIFIC CHARACTERS.— *Leaves* linear, ½–1 in. long, cuspidate, margins somewhat revolute (strongly so when dry) bright green above, glaucous beneath, furnished with a short petiole. *Staminate aments* about ½ in. long when fully expanded. *Fruit* with coral-red, somewhat translucent flattened cup; seed 2–4 lines long, somewhat compressed and 3-angled above, acute and terminated by the micropyle, minutely roughened.

(The specific name, *brevifolia*, is from the Latin *brevis*, *short*, and *folium*, *leaf*.)

The Yew of the Pacific coast is of rather open loose pyramidal habit of growth, with long horizontal and deflected lower branches and drooping branchlets. It occasionally attains the hight of 75 or 80 ft. (24 m.) with a trunk 2 or 3 ft. (0.90 m.) in diameter, clothed in a very thin reddish-brown bark, which checks with age and the outer layer exfoliates in fibrous strips, or flakes off in irregular scales, the outlines of which are indicated in the remaining bark by raised lines about the places from which they came.

HABITAT.— From the Santa Cruz Mountains, and the vicinity of the Yosemite Valley in the Sierra Nevada Mountains, northward to the islands and Coast Ranges of British Columbia, and eastward as a shrub to Idaho and Montana. It attains its greatest development in western Oregon,

Washington and British Columbia. It grows in low rich soil, close along the banks of streams over which it extends its long flexuous branches.

Physical Properties.— Wood rather heavy, hard, very close-grained and strong, elastic, very durable in contact with the soil and susceptible of a exceedingly smooth polish. It is of a soft pinkish-brown color with thin nearly white sap-wood. Soon after being cut, the exposed end of the heart-wood turns to a bright blood-red color, but that is only on the surface and unfortunately does not appear in our sections. *Specific Gravity*, 0.6391; *Percentage of Ash*, 0.22; *Relative Approximate Fuel Value*, 0.6377; *Coefficient of Elasticity*, 76133; *Modulus of Rupture*, 1078; *Resistance to Longitudinal Pressure*, 483; *Resistance to Indentation*, 264; *Weight of a Cubic Foot in Pounds*, 39.83.

Uses.—Valuable for fence-posts, etc., on account of its great durability in contact with the soil, and it is particularly adapted to turnery. The Indians of the Northwest use it for their paddles, fish-hooks, etc., and the elasticity of the wood is such that they find in this the choicest material for their bows. For that reason we are told that they designate the Yew by a name which translated means "fighting wood," a name strangely referring to the same property and use as that referred to when the ancient Greeks named the European Yew *Τα῾ξος* from *Το῾ξον*, a bow.

Medicinal Properties have not been investigated of this species, nor is it known whether the leaves and seeds of this tree possess the poisonous properties found in the European species.

145. TORREYA CALIFORNICA, Torr.*

California Nutmeg, False or Wild Nutmeg.

Ger., *Californianische Muskatennusz;* Fr., *Muskade de Californie;* Sp., *Nuez moscada de California.*

Specific Characters:—*Leaves* linear, 1–3 in. long, very rigid, acuminate and pungent, with short stout appressed petioles, bright green above, paler beneath, and most of the leaves twisting at the base so as to form a flat 2-ranked spray. *Staminate aments* 4–5 lines long, with the inner basal scales scarious and toothed; anthers nearly 1 line in length. *Fruit* oblong to obovoid, 1–1¼ in. long, with smoothish slightly compressed nut, somewhat resembling a pecan nut, but more acute, and when covered with the fleshy testa both externally and internally resembling the commercial nutmeg in appearance, though of no value for flavoring purposes.

A handsome graceful tree of rather wide pyramidal head of dark-green foliage and of peculiar aspect on account of the width of its flat sprays;

* *Tumion Californicum*, Greene.

and so rigid and sharp are its leaves that one has to approach them about as cautiously as he would a spiny cactus. The leaves when crushed emit a strong odor very much like that of the tomato vine, as is the case with the Florida species.

The tree from which the accompanying sections were taken was the largest we have any record of, and its dimensions might be cited as perhaps the maximum attained by the species. This tree, which stood in Mendocino Co., Cal., a few miles from the coast, had but a few days previous to our visit fallen in consequence of an almost unprecedented freshet, which had so weakened its footing that it fell, a monarch which had withstood the storms of centuries heretofore. As it lay with its roots in air and foliage still fresh we had an excellent opportunity of noting it dimensions. The extreme top was dead and had been broken off at a point where it was 5 in. (12.7 c. m.) in diameter, probably a loss of several feet, but measuring from the roots to that point we found it to be 85 ft. (25.90 m.) and its straight columnar trunk was 4 ft. (1.22 m.) in diameter at 18 in. from the ground line and densely overgrown with moss and ferns, as is common in those shady cañons, nearly its entire length. At 35 ft. from the ground, where we took out the material for the accompanying sections it was 33 in. in diameter. The handsome log that was left we were told would be taken to the saw-mill (of the Union Lumber Company) at Fort Bragg.

HABITAT. — An uncommon and rather local tree, being found along the streams and bottoms of the cañons of the mountains near the coast, from Mandocino County southward to the Santa Cruz Mountains, and also on the western slopes of the Sierra Nevada Mountains from Yuba to Tulare Counties.

PHYSICAL PROPERTIES. — Wood light, soft, compact, very durable in contact with the soil, with fine close grain, easily worked and susceptible of a smooth polish; of a clear light-yellow color with whitish sap-wood. The heart-wood possesses the same strong peculiar and somewhat terebinthinate odor which we have noted of the Florida species. *Specific Gravity*, 0.4760; *Percentage of Ash*, 1.34; *Relative Approximate Fuel Value*, 0.4696; *Coefficient of Elasticity*, 40146; *Modulus of Rupture*, 583; *Resistance to Longitudinal Pressure*, 351; *Resistance to Indentation*, 122; *Weight of a Cubic Foot in Pounds*, 29.66.

USES. — Too rare a wood to be popular for any particular use, but of excellent properties for skiff-building, etc., where a light and durable wood is desired, and for cabinet-making, fencing, etc.

MEDICINAL PROPERTIES. — None are known of this species.

Genus PINUS, Tournefort.

Leaves evergreen, needle-shaped, from slender buds, in clusters of 2–5 together, each cluster invested at its base with a sheath of thin, membranous scales. *Flowers* appearing in spring, monœcious. *Sterile flowers* in catkins, clustered at the base of the shoots of the season; stamens numerous with very short filaments and a scale-like connective; anther-cells, 2, opening lengthwise; pollen grains triple. *Fertile flowers* in conical or cylindrical spikes — cones — consisting of imbricated, carpellary scales, each in the axil of a persistent bract and bearing at its base within a pair of inverted ovules. *Fruit* maturing in the autumn of the second year, a cone formed of the imbricated carpellary scales, which are woody, often thickened or awned at the apex, persistent, when ripe, dry and spreading to liberate the two nut-like and usually winged seeds; cotyledons 3–12, linear.

(*Pinus* is a Latin word from Celtic *pin* or *pen, a crag.*)

146. PINUS LAMBERTIANA, Dougl.

Sugar Pine.

Ger., *Zukre-Fichte;* Fr., *Pin à Sucre;* Sp., *Pino de azucar.*

Specific Characters. — *Leaves* in 5s, 3–5 in. long, rather thick, rigid, with denticulate margins and with loose deciduous sheaths. *Staminate aments* oval, ½ in. long, and with 10–15 involucral scales; crest of anthers denticulate. *Cones* subterminal, cylindrical, large, 12–18 in. or even more in length, and 2–4 in. in diameter when closed (expanding to 6 or 8 in.), drooping, 1–4 together on pedicels 2–3 in. long, with broad, round-pointed scales slightly thickened at apex, the apophysis and seeds ½ in. or somewhat more in length, black, smooth, with edible kernel, obtuse wing not quite twice as long as the seed and widest below the middle; cotyledons 13–15.

A magnificent tree, the grandest of the important genus to which it belongs, and but for the Sequoias would be considered one of the wonders of the world in the line of arboreal growth. Indeed, it may well be as it is, as individuals are recorded as attaining the height of 300 ft. (90 m.), and with trunks 20 ft. (6 m.) in diameter, though such trees are a half or a third larger than commonly seen. It has a beautiful columnar trunk, destitute of branches to a height of 100 feet or more, then develops an open pyramidal head, small for the size of trunk, but still large, and from the ends of the branches hang its wonderful cones fully in keeping with the size of the tree. The bark of trunk is of a dark gray color, rough with rather firm longitudinal ridges, resembling that of the white pine (*P. Strobus*). Upon the stumps and burned trunks may be found a sugary manna-like exudation from which the tree takes its name.

Habitat. — From northern Oregon southward among the Cascade, Sierra Nevada and Coast Ranges, mostly from 300 to 8,000 ft. altitude, generally interspersed with other timbers and over which it rears its lofty head, attaining its greatest size on the Sierras of central and northern California.

Physical Properties. — Wood light, soft, compact, easily worked, quite satiny, with very large and conspicuous resin passages and bands of

summer-cells thin; of a delicate pinkish-brown color with yellowish-white sap-wood. *Specific Gravity*, 0.3684; *Percentage of Ash*, 0.22; *Relative Approximate Fuel Value*, 0.3676; *Coefficient of Elasticity*, 79375; *Modulus of Rupture*, 597; *Resistance to Longitudinal Pressure*, 336; *Resistance to Indentation*, 78; *Weight of a Cubic Foot in Pounds*, 22.96.

USES. — This timber is applied to quite the same uses as the White Pine of the east, and is the most highly valued of the woods of California for doors, sash, blinds, etc., and is applied to many other uses. The sugary exudation is sometimes used as a substitute for sugar, and the seeds as an article of food.

MEDICINAL PROPERTIES.—The sugary exudation is actively purgative, and is used to some extent in domestic practice.*

147. PINUS PONDEROSA, DOUGL.

CALIFORNIA YELLOW PINE, BULL PINE.

Ger., *Californianische Gelbe Fichte;* Fr., *Pin jaune de Californie;* Sp., *Pino amarillo.*

SPECIFIC CHARACTERS. — *Leaves* in threes, very stout, mostly 7–10 in. long, with ragged sheaths at first ½ to ¾ in. long (finally about ¼ in.), springing from the axils of linear fimbriated bracts with thick persistent bases and densely crowded at the ends of the thick rough branchlets. *Staminate aments* cylindrical, fleuxuous 1½–2 in. long, densely crowded into a short head, involucre of 10–12 bracts; anthers with a large semi-circular scarcely dentate crest. *Cones* subterminal, often several (2–5 or 7) together in a whorl, 3–5 in. long, sessile or nearly so, of a rich brown color, narrow ovoid when closed (ovoid when open), somewhat curved, spreading or reflexed upon the branchlet, scales thickened at the apex and with umbo high and stout, straight prickle; seeds dark-brown ½ in. long, with straight wing about 1 in. or slightly less in length and widest above the middle; cotyledons 6–9. The cones at maturity break away from the branch by a fracture within the base of the cone, leaving some of the basal scales attached to the branch.

Var. *scopulorum* is a smaller and more spire-shaped form of tree found among the Rocky Mountains to the eastward, with leaves and cones somewhat smaller than in the type form.

(The specific name, *ponderosa*, is the Latin for *heavy*.)

Another giant representative of its genus, being but little inferior to the Sugar Pine in stature, the largest individuals attaining 300 ft. in height, and 15 ft. (4.50 m.) in diameter of trunk. Trees of those dimensions are rare, but individuals of upwards of half the dimensions noted are by no means uncommon. Its branches are long and horizontal, or drooping and forming a flat-pyramidal or rounded summit. The bark of trunk is characteristic, being thick, of a yellowish-brown color, and checked into large, irregular, flat and smooth plates 8 or 10 in. wide on large trunks.

* *U. S. Dispensatory*, 16th ed., p. 955.

HABITAT. —The most widely distributed of the western pines, being found from Mexico northward among the mountains of the Pacific Region into British Columbia, and eastward as far as the Black Hills of Dakota, thriving on dry rocky mountain slopes, and forming extensive tracts of forest interspersed with Sugar Pine, White Fir, etc. It attains its greatest size on the Sierra Nevada Mountains of central and northern California.

PHYSICAL PROPERTIES.—Wood heavy, hard, strong, brittle, compact, not durable in contact with the soil, very resinous and of a light reddish-brown color, with thick sap-wood nearly white. *Specific Gravity,* 0.4715; *Percentage of Ash,* 0.35; *Relative Approximate Fuel Value,* 0.4698; *Coefficient of Elasticity,* 88731; *Modulus of Rupture,* 720; *Resistance to Longitudinal Pressure,* 381; *Resistance to Indentation,* 107; *Weight of a Cubic Foot in Pounds,* 29.38.

USES.—A tree of great economic value, being largely manufactured into lumber for general construction purposes and for railway ties, etc. It is a favorite wood for "shakes" in some localities where the Redwood is not found, as it splits with great facility.

MEDICINAL PROPERTIES are those of the turpentine, etc., which may be derived from the tree, though not the commercial source.

148. PINUS CONTORTA, DOUGL.

CALIFORNIA SCRUB PINE.

Ger., *Californianische Schlechte Fichte;* Fr., *Pin tordu de Californie;* Sp., *Pino torcido.*

Leaves in pairs, mostly 1½–2½ in. long with sheaths ¼ in. or less in length, rigid, closely serulate, deeply channeled, bracts scarcely fringed. *Staminate* aments cylindrical-oblong ½ in. long; anthers with semi-circular crests. *Cones* small, 1-3 in. long, subterminal, singly or two or more together, sessile or nearly so, cylindrical-ovoid when closed oblique, often curved, deflected, many persisting long upon the tree; scales obtusely pointed, thickened and armed with a long and rather weak prickle; seed blackish, wing ½ in long, widest above the base and tapering upward; cotyledons 5, sometimes 4.

(The specific name *contorta,* is the Latin for *twisted,* or *distorted.*)

This interesting little pine with very dense top is found close along the bluffs of the Pacific Coast like a breastworks in battling against the tempests from the ocean, and behind which the taller trees can grow in safety. In these situations the outermost trees are small with foliage massed together, and those further back attaining the height of 30 or 40 ft. (10 m.) with wide rounded close top and with trunk 1–2 ft. (0.60 m.) or sometimes more in diameter. Occasionally trees are found alone in

these situations when they are very much distorted by the prevailing winds from the ocean, leaning and reaching almost full length off to leaward.

PHYSICAL PROPERTIES.—Wood light, soft, (or sometimes quite hard) of moderate strength, brittle and usually very resinous. It is of a light pinkish yellow or brown color with lighter sap-wood and when freshly cut markedly fragrant with an odor suggestive of that of lemons, *Specific Gravity*, 0.5815; *Percentage of Ash*, 0.19; *Relative Approximate Fuel Value*, 0.5804; *Coefficient of Elasticity*, 158533; *Modulus of Rupture*, 993; *Resistance to Longitudinal Pressure*, 554; *Resistance to Indentation*, 149; *Weight of a Cubic Foot in Pounds*, 36.24.

HABITAT. — In the close proximity of the coast from Mendocino County, California, to Alaska, and farther inland on the western slopes of the Coast Ranges.

USES. — Wood little used, but the shelter offered by the barrier of these trees against the storms from the ocean in winter is really worthy of mention. Not only tender plants but cattle, etc., are sheltered by it.

MEDICINAL PROPERTIES. — None are mentioned of this tree.

149. PICEA SITCHENSIS, CARR.

TIDE-LAND SPRUCE.

Ger., *Fluthland-Tanne;* Fr., *Sapin du rivage de la mer;* Sp., *Abeto de la ribera del mar.*

SPECIFIC CHARACTERS :—*Leaves* ½–⅞ in. long, flat but keeled above and below, 1 line or less in width, rigid, abruptly pointed, with conspicuous stomata, glaucous whitish, prominently so when young, pointing every way, with prominent bases, persistent on the long thickish drooping glabrous branchlets. *Cones* cylindrical, 1½–3 in. long and scarcely 1 in. thick when closed, pale yellowish-brown, with thin elongated scales, rather truncate and incisely denticulate at apex and lanceolate rigid bracts of ⅛ or ¼ their length; seeds 1 line long or somewhat more and with wing ¼-⅓ in. long by about 1½ lines broad; cotyledons, 4-6.

(The specific name, *Sitchensis* is a Latinized word, meaning of Sitka, near which place this tree is abundant.)

A tree of rare beauty, developing as it does a vigorous wide pyramidal top, with long gracefully curved lower branches festooned with its drooping sprays and beset with its handsome pendant-like cones. Probably the tallest of its genus, it sometimes attains the height of 200 ft. (61 m.) with a trunk even 15 or 16 ft. in diameter, and vested in a thin and rather smooth reddish-brown bark, which flakes off in irregular rounded scales.

HABITAT.—The near proximity of the Pacific Coast from Mendocino County, California, northward to Alaska, in rich moist soil, and especially abundant and well-developed in western Oregon and Washington where it forms extensive forests.

Physical Properties.—Wood light, soft, strong, with close straight grain, compact and with satiny lustre. It differs from our eastern representatives of the genus in having more highly colored heart-wood, which is of an orange-brown color. The rather thin sap-wood is of a yellowish-white color. *Specific Gravity*, 0.4287; *Percentage of Ash*, 0.17; *Relative Approximate Fuel Value*, 0.4280; *Coefficient of Elasticity*, 99001; *Modulus of Rupture*, 649; *Resistance to Longitudinal Pressure*, 353; *Resistance to Indentation*, 73; *Weight of a Cubic Foot in Pounds*, 26.72.

Uses.—A valuable timber for interior finishing, fencing, boat-building, general construction purposes, cooperage, etc.

Medicinal Properties have not been recorded of this species.

Genus **PSEUDOTSUGA**, Carrière.

Leaves flat, linear, sulcate above, ridged beneath, short petiolate, somewhat 2-ranked by a twist in the base, whitish stomatose beneath only, and when breaking away from the glabrous branchlet leaving prominent transversely oval leaf scars. *Flowers* from the axils of the last year's leaves the staminate short, cylindric-oblong and surrounded with the conspicuous orbicular bud-scales, the anthers short, obcordate, 2-celled and opening obliquely by a continuous slit, crest short and tubercular; pollen-grains ovate-subglobose. *Cones* subterminal, cylindric-oblong, maturing the first year, reflexed and pendent, with wide rounded thin persistent scales, and between these broad-linear, 3-lobed ligulate, persistent bracts, much exserted on young and vigorous trees, but less so on others; seeds without resin-vescicles, and the wing finally breaking off; cotyledons 6-12.

An American genus with name derived from *ψεῦδος*, *false*, and *Tsuga*, *Hemlock*, alluding to its resemblance with that genus.

150. PSEUDOTSUGA TAXIFOLIA, Lambert.*

Douglas Spruce, Red or Yellow Fir, Oregon Pine.

Ger., *Tanne von Douglas*; Fr., *Sapin de Douglas*; Sp., *Abeto de Douglas*.

Specific Characters.— *Leaves* ¾-1 in. long by ¾ line wide (somewhat larger on more vigorous shoots). *Staminate flowers* 5-10 lines long, half inclosed by the loose involucral bud-scales. *Cones* 2-3 in. long (exceptionally, 4 in. on vigorous young trees); seed subtriangular, reddish-brown above, whitish below, ¼ in. or less in length, wing ¼-⅓ in. long, broadest near the base, 2-3 lines; cotyledons 6-8.

(The specific name, *taxifolia*, is from *Taxus*, *the yew*, and *folium*, *leaf*, not well applied, it would seem, as the resemblance in the leaves is not marked.)

Another tree of marvelous dimensions at times, beautiful aspect, and of which America may well be proud. It occasionally attains the height of 300 ft. (92 m.), with straight columnar trunk 10 or 12 ft. (3 m.) in diameter. When growing apart from other trees, it developes a graceful pyramidal top. The bark of trunk is characteristic, being of a dark-gray color, rough, with thick firm ridges which branch and unite with each other in such a manner as to suggest, we might almost say, a braided ap-

* *Pseudotsuga Douglasii*, Carr.

pearance. We see occasionally quite similar bark, though in a smaller way, in our eastern Hemlock. The bark of the young trees contains blisters filled with pitch similar to that seen in the eastern Balsam and other Firs.

HABITAT.— A tree of extensive range, being found abundantly in British Columbia, south of latitude 55° N. and southward among the mountain ranges generally, as far east as Montana, Wyoming, Colorado and western Texas, and into Mexico, excepting the region between the Sierra Nevada and the Wahsatch Mountains. It is a tree of great range of altitude also, being found equally vigorous near the coast and 8,000 or 10,000 feet above tide. It is particularly an abundant tree in Oregon, Washington and northern California, and in places forms exclusive forests of great density and grandeur of growth where "the trees stand relatively as near to each other, and the trunks are as tall and slender as the canes in a cane-brake."

USES.— The most valuable timber, taking into consideration its great abundance and the variety of its usefulness, of the Pacific region, being manufactured into lumber for all kinds of construction purposes, for railway ties, and especially valued for the spars of vessels and in shipbuilding. Vast quantities of this timber are shipped to foreign countries. The bark is useful for tanning purposes.

PHYSICAL PROPERTIES.— Wood quite variable in properties, but hard, strong, durable, difficult to work, and bands of summer cells conspicuous, broad and hard. The heart-wood is of a yellowish or reddish-brown color and the sap-wood nearly white. The lumbermen recognize two varieties of the lumber as Yellow Fir and Red Fir, according to the color, the former being of finer grain and more valuable than the latter. These are distinctions in the wood only and not accompanied by distinctions in botanical characters. *Specific Gravity,* 0.5157; *Percentage of Ash,* 0.08; *Relative Approximate Fuel Value,* 0.5153; *Coefficient of Elasticity,* 128297; *Modulus of Rupture,* 881; *Resistance to Longitudinal Pressure,* 519; *Resistance to Indentation,* 100; *Weight of a Cubic Foot in Pounds,* 32.14.

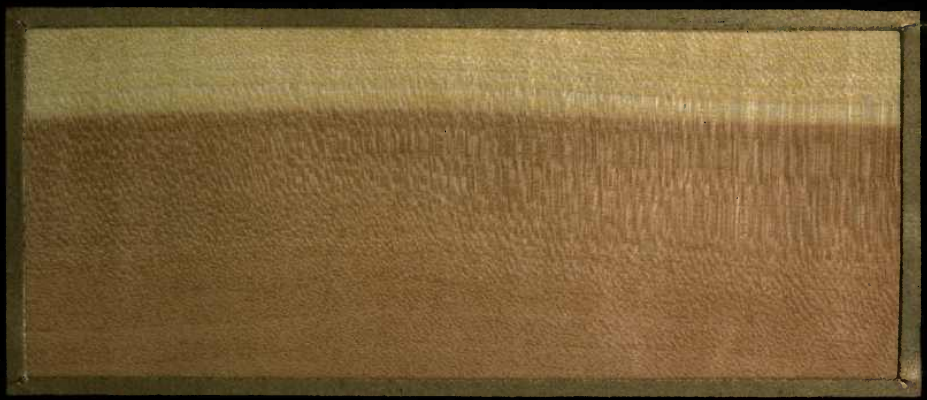
MEDICINAL PROPERTIES are not claimed of this species.

INDEX.

126. RHAMNUS PURSHIANA, DC.

Bearberry, Sacred-bark, Buckthorn, Shittim-wood, Wild Cherry.

TRANSVERSE SECTION.



RADIAL SECTION.

TANGENTIAL SECTION

Ger. Kreuzdorn von Pursh. Fr. Nerprun de Pursh.

Sp. Cascara Sagrada.

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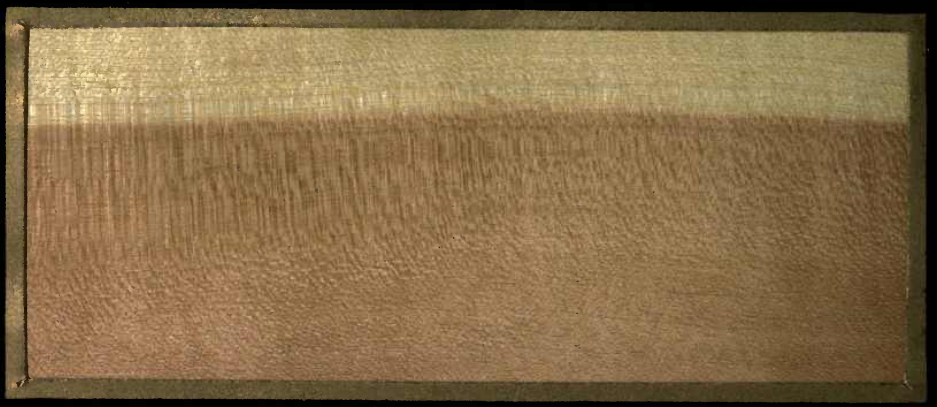

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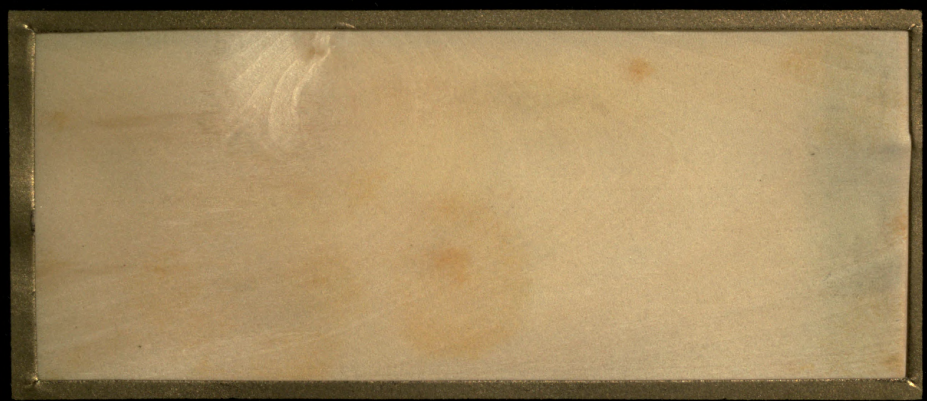
127. AESCULUS CALIFORNICA, NUTT.

California Buckeye.

TRANSVERSE SECTION.

RADIAL SECTION.



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. Californianische Roszkastanie. *Fr.* Marronier de Californie.

Sp. Esculo Californiano.

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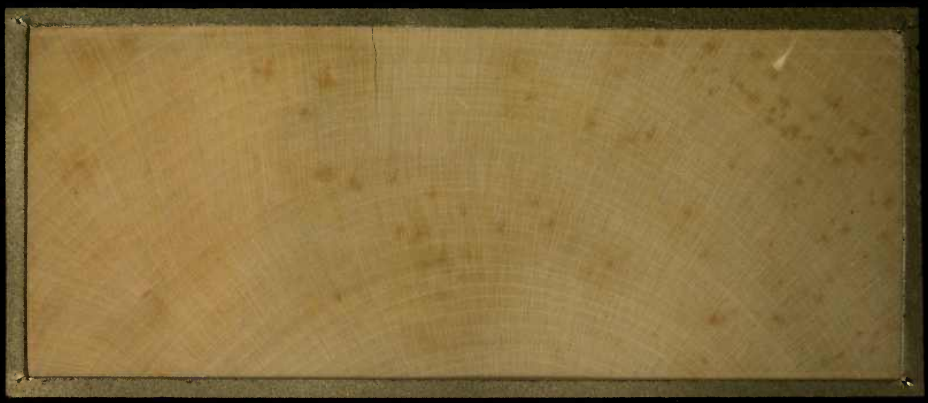

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128. CERCIDIUM TORREYANUM, WATSON.

Green-barked Acacia, Palo Verde.

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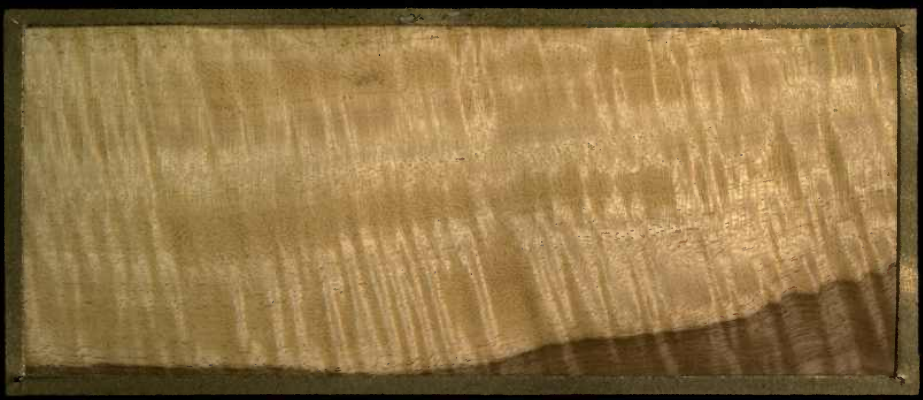

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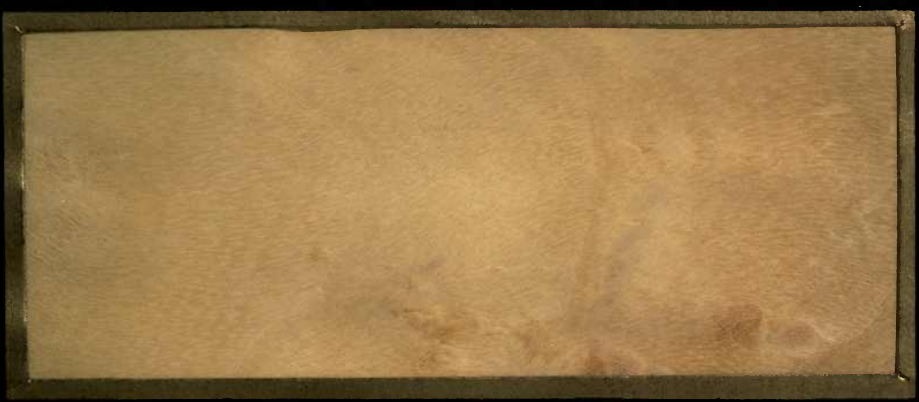

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Ger. Grünrinde Acacie. Fr. Acacia à écorce vert.

Sp. Palo Verde.

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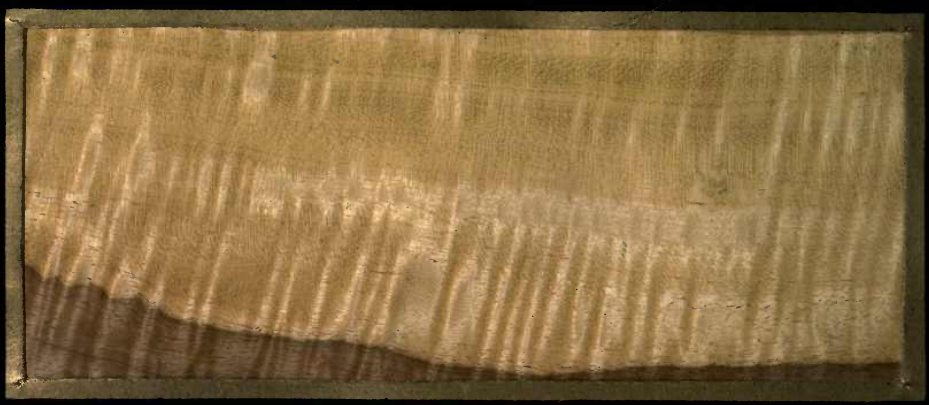

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Sp. Palo Verde.

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129. PROSOPIS JULIFLORA, DC.

Mesquit, Mesquite, Honey Pod.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Honighülse. *Fr.* Cosse de Miel.

Sp. Algaroba.

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Mountain Mahogany.

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Sp. Caoba de montaña.

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131. GARRYA ELLIPTICA, DOUGL.

Silk-tassel Tree, Quinine Tree.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Seidenquastenbaum. *Fr.* Arbre à signets de soie.

Sp. Arbol de borlita de seda.

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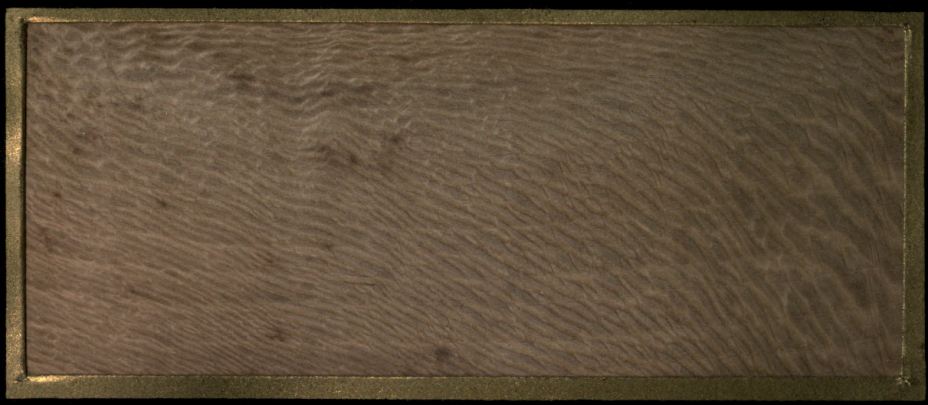

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132. ARBUTUS MENZIESII, PURSH.

Madroña, Madroña Laurel, Strawberry Tree.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Erdbeerbaum von Menzies. *Fr.* Arbousier Menzies.

Sp. Madroña.

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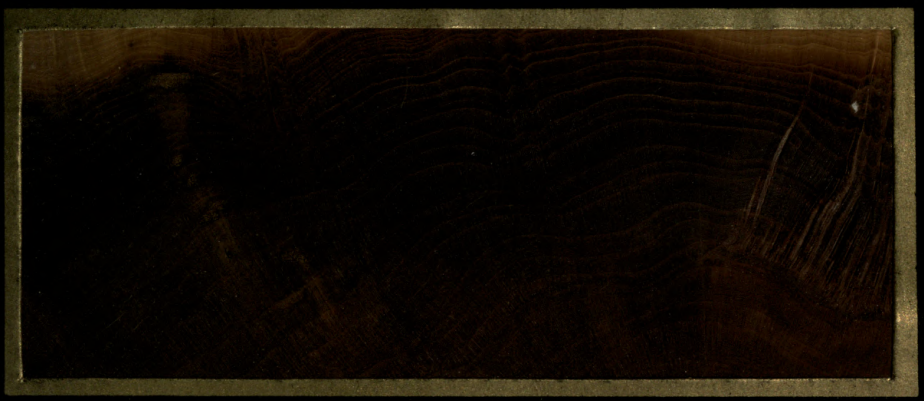
133. ARCTOSTAPHYLOS PUNGENS, HBK.

Common Manzanita.



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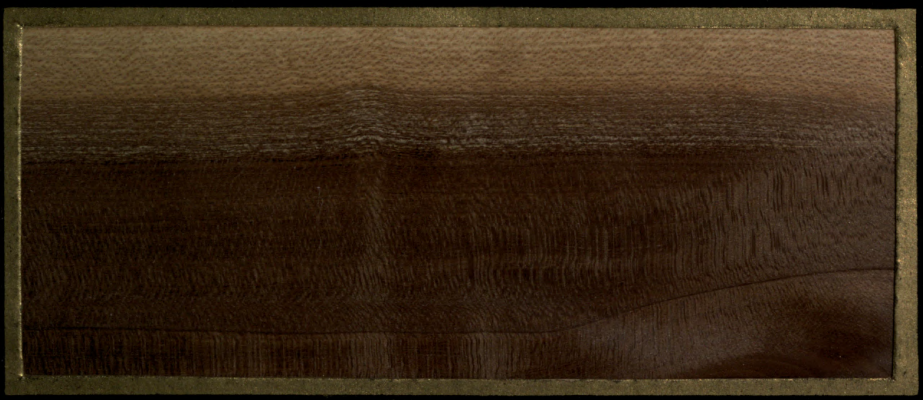

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Ger. Californianische Bärentraube. Fr. Busserole de Californie.

Sp. Manzanita comun.

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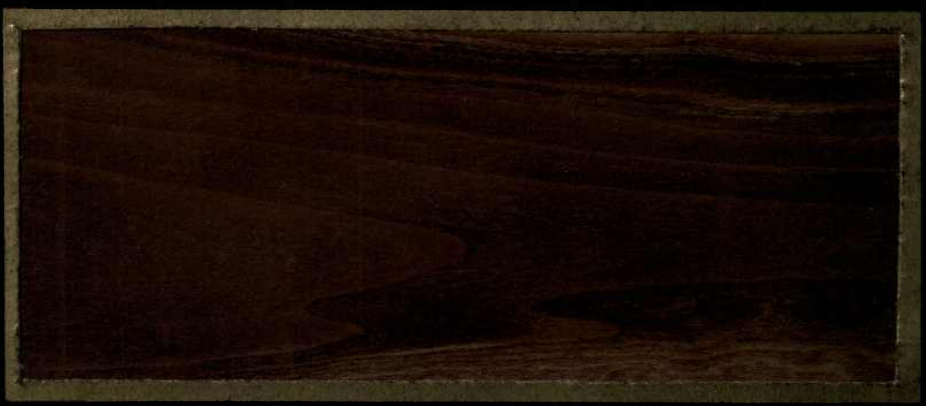

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Sp. Manzanita comun.

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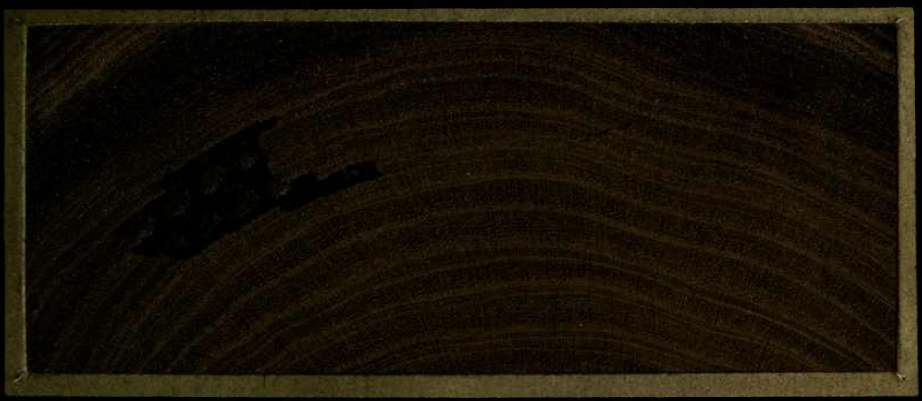
134. CHILOPSIS SALIGNA, D. DON.

Desert Willow, Flowering Willow.



TRANSVERSE SECTION.

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TANGENTIAL SECTION

Ger. Wüste-Weide. Fr. Saule du desert.

Sp. Sauce del desirto.

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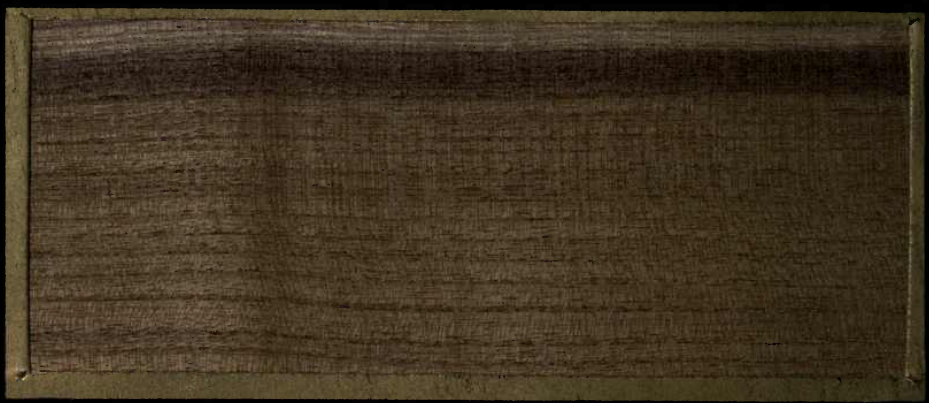

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135. PLATANUS RACEMOSA, NUTT.

California Sycamore.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Californianische Platane. Fr. Platane de Californie.

Sp. Platano de California.

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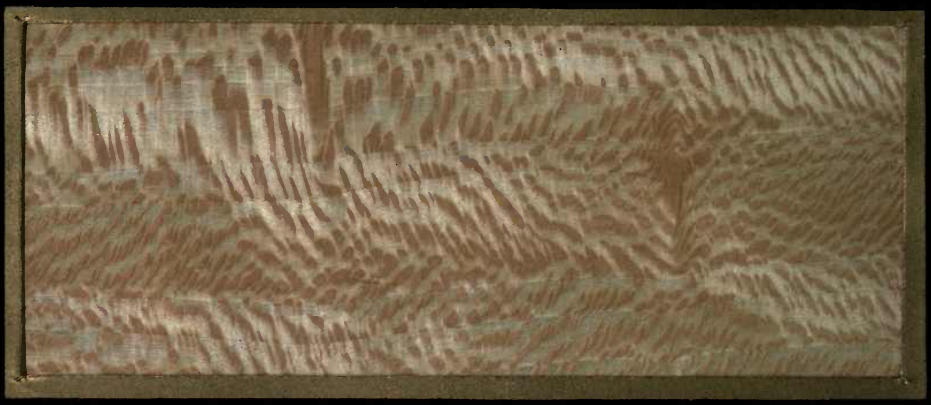

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Sp. Platano de California.

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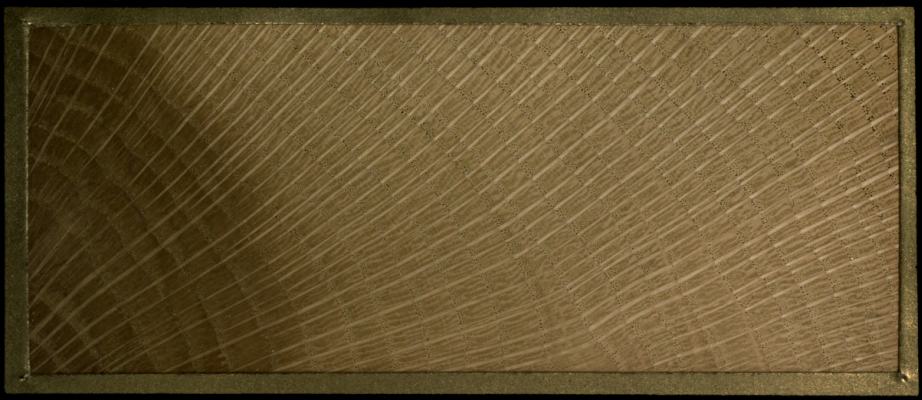
136. QUERCUS GARRYANA, DOUGL.

Oregon Oak, Mountain White Oak.



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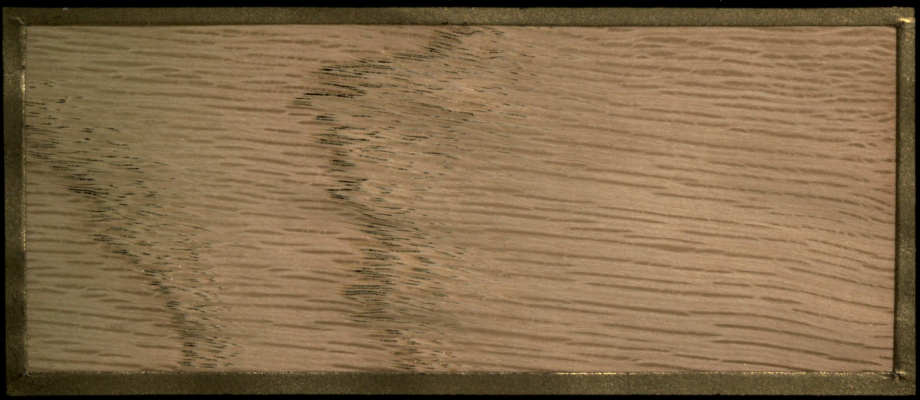
RADIAL SECTION.



TANGENTIAL SECTION

Ger. Oregonische Eiche. *Fr.* Chêne de Oregon.

Sp. Roble de Oregon.

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Oregon Oak, Mountain White Oak.

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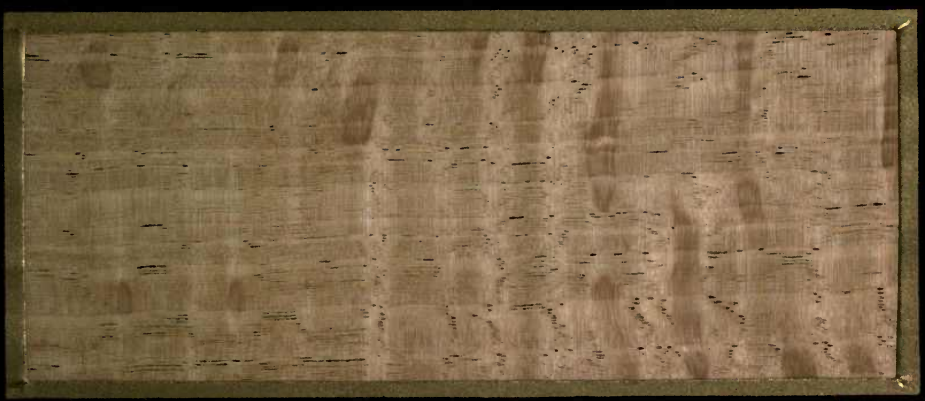
137. QUERCUS AGRIFOLIA, NÉE.

Coast Live Oak, Holly-leaved Oak.

TRANSVERSE SECTION.



RADIAL SECTION.

TANGENTIAL SECTION

Ger. Immergrüne Eiche von der Kuste. *Fr.* Chêne vert de la côte

Sp. Encina.

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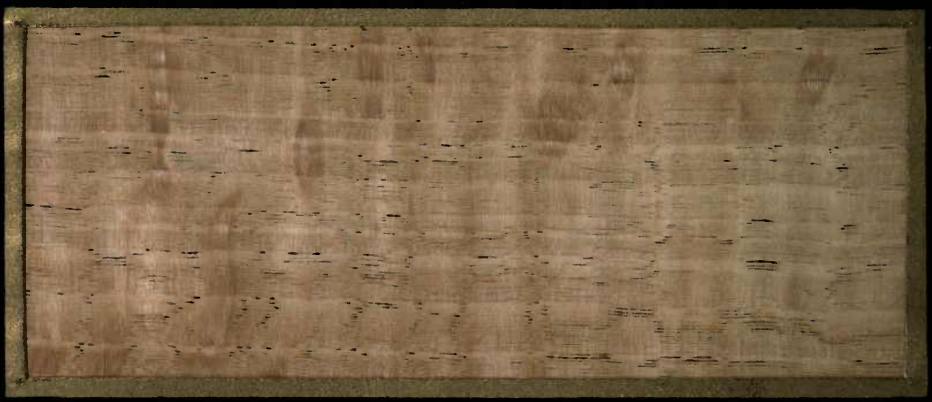

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Sp. Encina.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

138. QUERCUS DENSIFLORA, H. & A.

Tan-bark Oak, Evergreen Chestnut Oak.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Eiche mit ditchen Blumen. *Fr.* Chêne à fleurs densas

Sp. Roble de flores densas.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

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139. CASTANOPSIS CHRYSOPHYLLA, A. DC.

California Chinquapin, Evergreen Chestnut.

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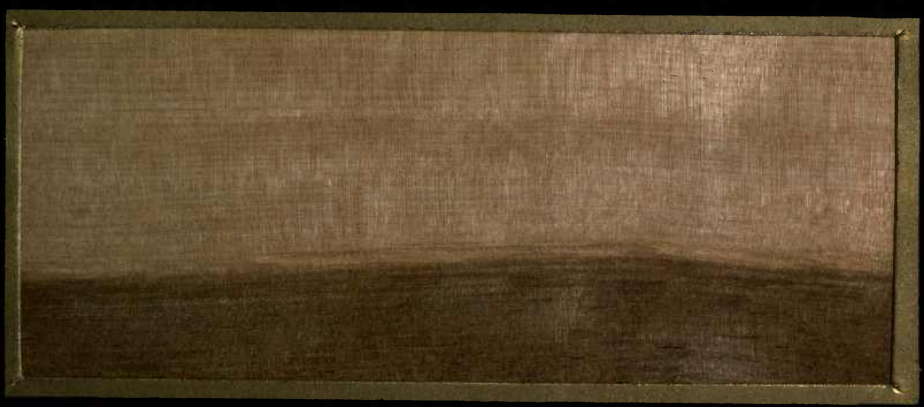

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Californianische Kastanie. Fr. Châtaignier de Californie.

Sp. Castaña de California.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

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California Chinquapin, Evergreen Chestnut.

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RADIAL SECTION.

TANGENTIAL SECTION

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Sp. Castaña de California.

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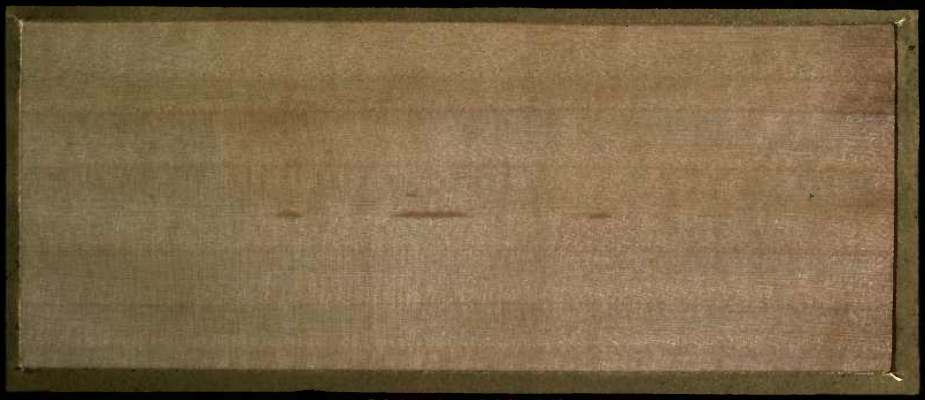
140. SALIX LAEVIGATA, BEBB.

California Black Willow.

TRANSVERSE SECTION.



RADIAL SECTION.

TANGENTIAL SECTION

Ger. Californianische Schwartze Weide. Fr. Saule noir de Californie.

Sp. Sauce negro de California.

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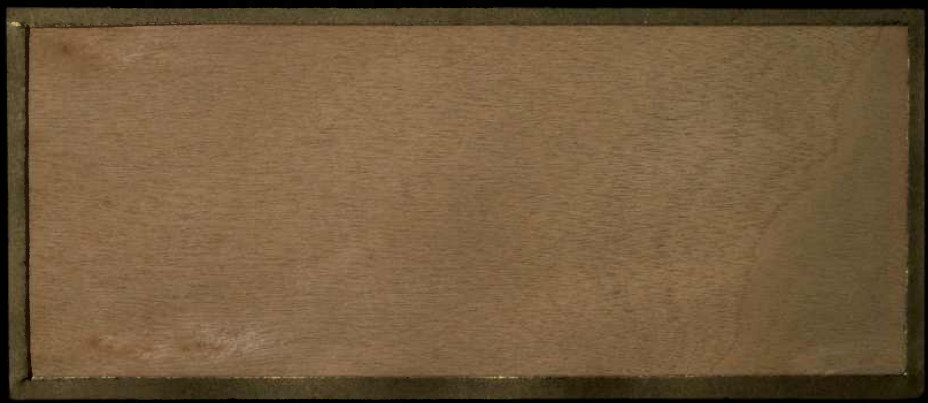
California Black Willow.

TRANSVERSE SECTION.

RADIAL SECTION.



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Sp. Sauce negro de California.

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141. LIBOCEDRUS DECURRENS, TORR.

Californian White Cedar, Post Cedar, Incense Cedar.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Californian Weisze Zeder. Fr. Thuya blanc de Californie.

Sp. Tuya blanco de California.

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Sp. Tuya blanco de California.

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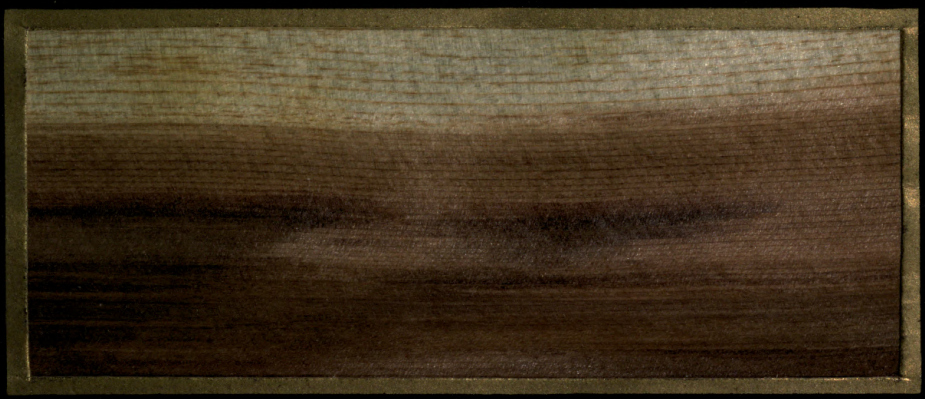
142. SEQUOIA GIGANTEA, DECSN.

Big Tree, Giant Redwood, Redwood of the Mountains.

TRANSVERSE SECTION.



RADIAL SECTION.

TANGENTIAL SECTION

Ger. Riesenbaum. *Fr.* Arbre gigantesque.

Sp. Arbol giganteo.

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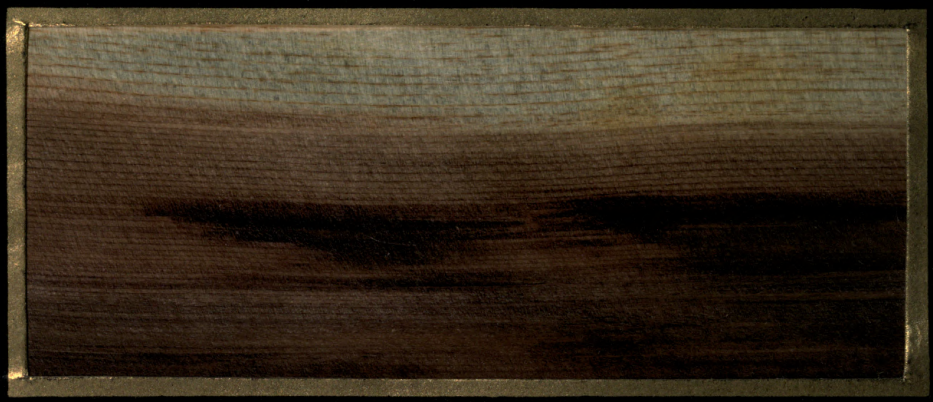
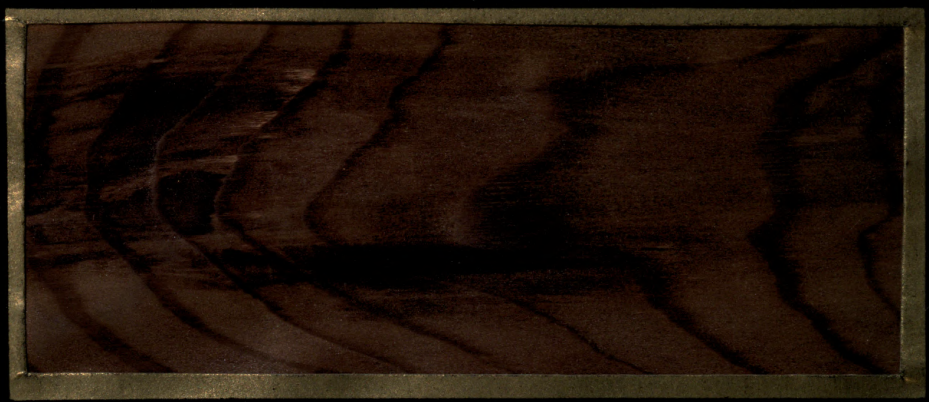
142. SEQUOIA GIGANTEA, DECSN.

Big Tree, Giant Redwood, Redwood of the Mountains.

TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION

Ger. Riesenbaum. *Fr.* Arbre gigantesque.

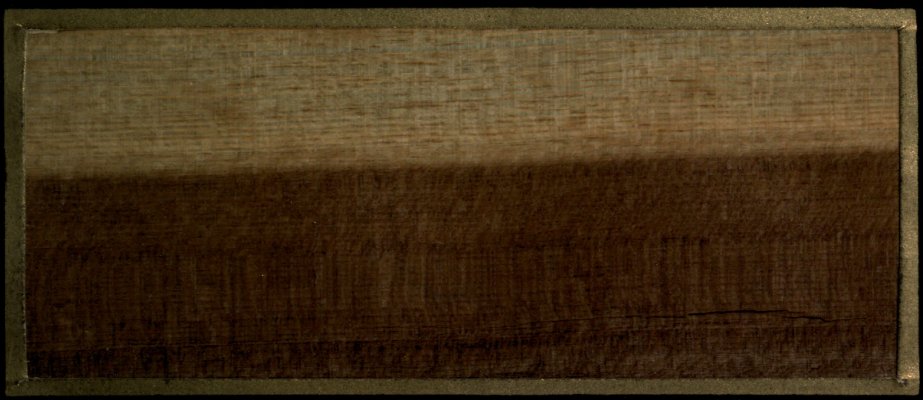
Sp. Arbol giganteo.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

143. SEQUOIA SEMPERVIRENS, ENDL.

Redwood of the Coast.

TRANSVERSE SECTION.



RADIAL SECTION.

TANGENTIAL SECTION

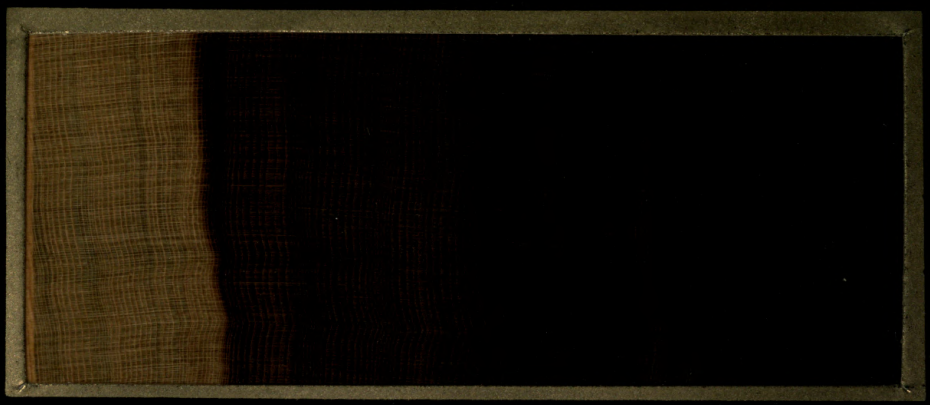
Ger. Californianischer Rothholz. *Fr.* Bois rouge.

Sp. Madera roja.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

143. SEQUOIA SEMPERVIRENS, ENDL.

Redwood of the Coast.



TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Californianischer Rothholz. Fr. Bois rouge.

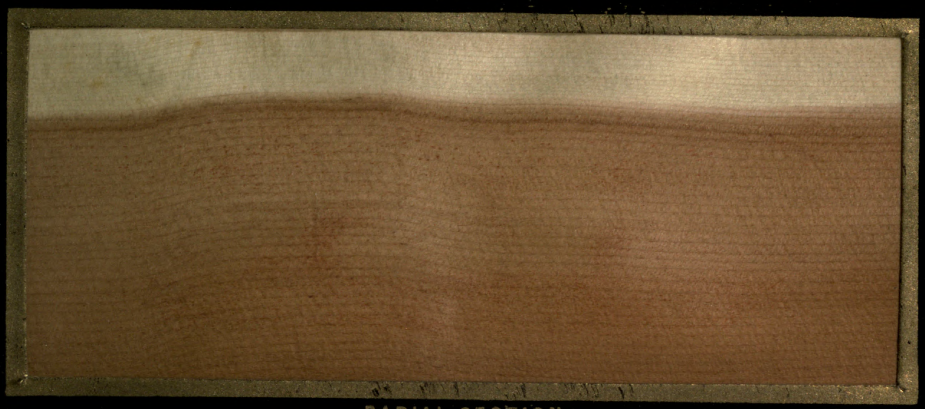
Sp. Madera roja.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

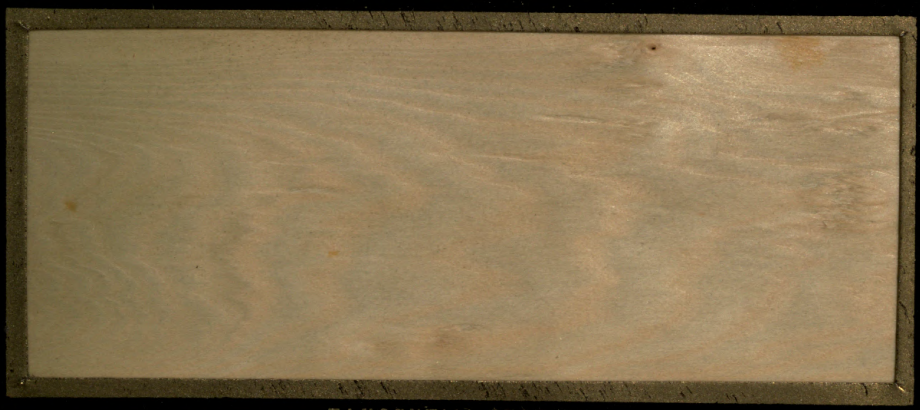
144. TAXUS BREVIFOLIA, NUTT.

Pacific Yew, California or Oregon Yew.

TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION

Ger. Californianischer Eibenbaum. Fr. If de Californie.

Sp. Tejo de California.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

144. TAXUS BREVIFOLIA, NUTT.

Pacific Yew, California or Oregon Yew.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Californianischer Eibenbaum. *Fr.* If de Californie.

Sp. Tejo de California.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

145. TORREYA CALIFORNICA, TORR.

California Nutmeg.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Californianische Muskatennusz. Fr. Muskade de Californie.

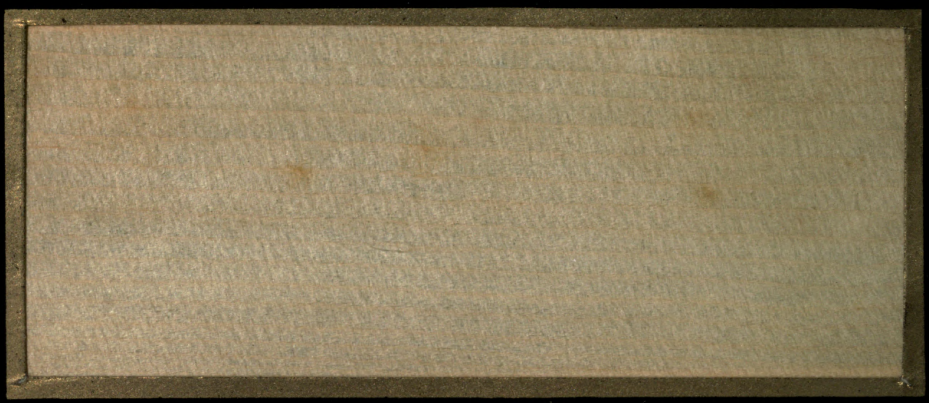
Sp. Nuez moscada de California.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

145. TORREYA CALIFORNICA, TORR.

California Nutmeg.

TRANSVERSE SECTION.



RADIAL SECTION.

TANGENTIAL SECTION

Ger. Californianische Muskatennusz. Fr. Muskade de Californie

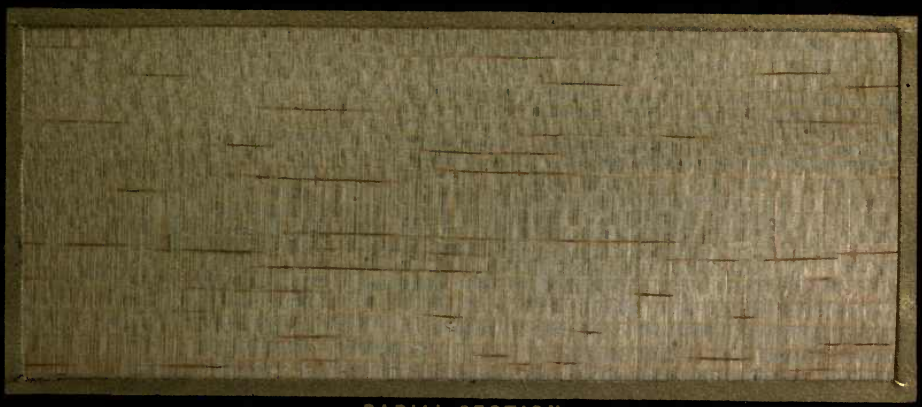
Sp. Nuez moscada de California.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

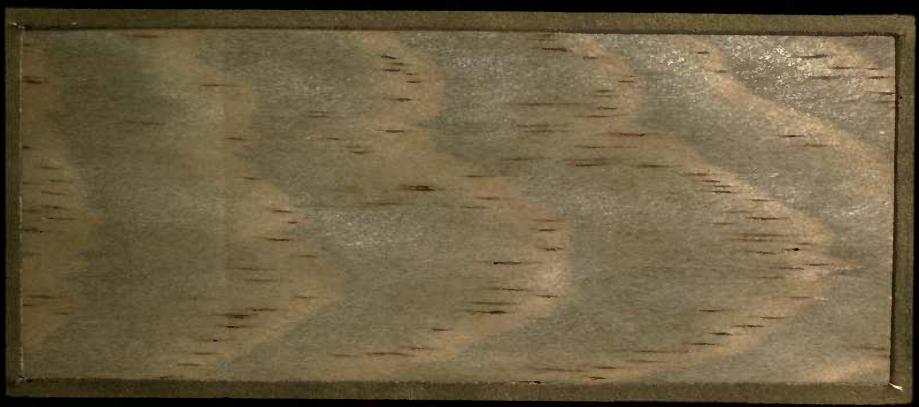
146. PINUS LAMBERTIANA, DOUGL.

Sugar Pine.

TRANSVERSE SECTION.



RADIAL SECTION.



TANGENTIAL SECTION

Ger. Zuckre-Fichte. Fr. Pin à sucre.

Sp. Pino de azucar.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

146. PINUS LAMBERTIANA, DOUGL.

Sugar Pine.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Zuckre-Fichte. *Fr.* Pin à sucre.

Sp. Pino de azucar.

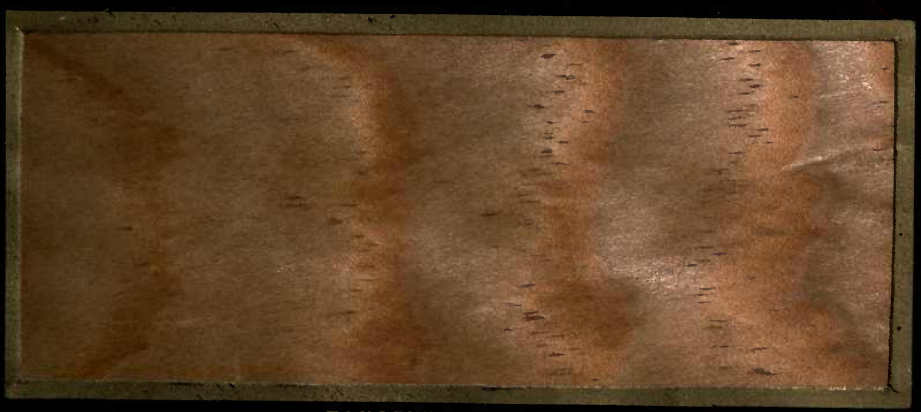
Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

147. PINUS PONDEROSA, DOUGL.

California Yellow Pine, Bull Pine.

TRANSVERSE SECTION.

RADIAL SECTION.



TANGENTIAL SECTION

Dr. Californianische Gelbe. Fichte. Fr. Pin jaune de Californie.

Sp. Pino amarillo de California.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

147. PINUS PONDEROSA, DOUGL.

California Yellow Pine, Bull Pine.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Gr. Californianische Gelbe. Fichte. Fr. Pin jaune de Californie.

Sp. Pino amarillo de California.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

148. PINUS CONTORTA, DOUGL.

California Scrub Pine.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Californianische schlechte Fichte. Fr. Pin tordu de Californie.

Sp. Pino torcido de California.

Published and Sections made by Romeyn B. Hough, R. A., Lowville, N. Y., U. S. A.

148. PINUS CONTORTA, DOUGL.

California Scrub Pine.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Californianische schlechte Fichte. Fr. Pin tordu de Californie.

Sp. Pino torcido de California.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

149. PICEA SITCHENSIS, CARR.

Tide-land Spruce.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Fluthland-Tanne. *Fr.* Sapin du rivage de la mer.

Sp. Abeto de la ribera del mar.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

149. PICEA SITCHENSIS, CARR.

Tide-land Spruce.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Fluthland-Tanne. Fr. Sapin du rivage de la mer.

Sp. Abeto de la ribera del mar.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

150. PSEUDOTSUGA TAXIFOLIA, BRITTON.

Douglas Spruce, Red Fir, Yellow Fir, Oregon Pine.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Tanne von Douglas. Fr. Sapin de Douglas.

Sp. Abeto de Douglas.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

150. PSEUDOTSUGA TAXIFOLIA, BRITTON.

Douglas Spruce, Red Fir, Yellow Fir, Oregon Pine.

TRANSVERSE SECTION.

RADIAL SECTION.

TANGENTIAL SECTION

Ger. Tanne von Douglas. Fr. Sapin de Douglas.

Sp. Abeto de Douglas.

Published and Sections made by Romeyn B. Hough, B. A., Lowville, N. Y., U. S. A.

PLATES 126-150

Collate before charging and before discharging.